The NATIONAL GEOGRAPHIC MAGAZINE

Vol. XV APRIL, 1904 No. 4

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Published by the National Geographic Society,
Hubbard Memorial Hall,
Washington, D. C.

$2.50 a Year 25 Cents a Number

Entered at the Post-Office in Washington, D. C., as Second-Class Mail Matter

THE NATIONAL GEOGRAPHIC MAGAZINE

An illustrated monthly, published by the National Geographic Society, at Washington, D. C. All editorial communications should be addressed to the Editor of the National Geographic Magazine, Hubbard Memorial Hall, Washington, D. C. Business communications should be addressed to the National Geographic Society, Hubbard Memorial Hall, Washington, D. C.

25 CENTS A NUMBER; $2.50 A YEAR

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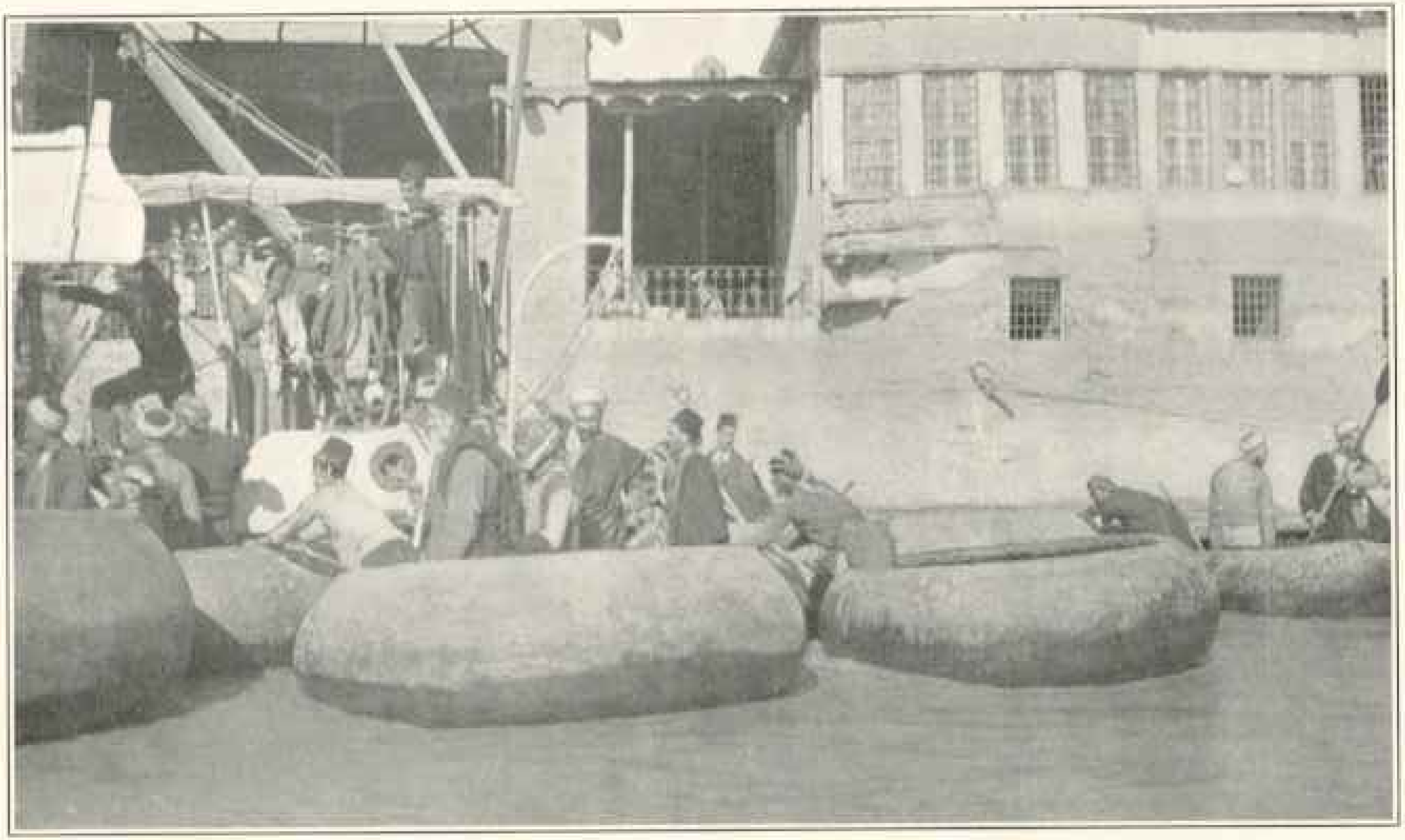

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Photo by Fairchild

Boats Used at Bagdad

The boats are perfectly round, and are built of wicker work covered with native asphalt. They are the same type of boat that has been used in this region for 3,000 years. The boatmen skull the boat with a broad, single-bladed paddle

Vol. XV, No. 4 WASHINGTON April, 1904

THE NATIONAL GEOGRAPHIC MAGAZINE

TRAVELS IN ARABIA AND ALONG THE PERSIAN GULF

By David G. Fairchild

Agricultural Explorer of the U. S. Department of Agriculture

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Will the hanging gardens of Babylon be rebuilt and Chaldea be re-created? are questions which the American public seldom thinks about; and yet such an experienced engineer of irrigation as Sir Wm. Willcocks, of Egypt, declares, after examining the accounts of the old irrigating canals of the land of Babylon, that the day is coming when this great region that was at one time one of the wealthiest in the world, but which today is little but a waste of desert, may some day be rebuilt and become, as Egypt is rapidly becoming, a wealthy agricultural country.

It was with the object of having this land of Babylon investigated and of securing for the American date garden of Arizona the best varieties of Persian and Arabian date plants that Mr Barbour Lathrop, of Chicago, sent the writer, as his agricultural explorer, on a trip to Bagdad. The region is noted as the largest date-growing region in the world, and probably ten millions would not be an exaggerated estimate of the number of majestic date palms that are scattered from the mouth of the Persian Gulf to beyond the region of Bagdad.

While the principal attention of an agricultural explorer must be given to the gathering of information regarding the plants of a region, the general political problems can not fail to impress him. Especially do such questions force themselves upon his attention in a region like that of the Persian Gulf, which, in the minds of the residents themselves, it is believed will have an interesting and possibly eventful future.

The trip from Bombay to Busra, which was taken on the *Pemba*, a steamer of fifteen hundred tons burden, required thirteen days, including the various stops along the Persian and Arabian coasts. These short stops give one a glimpse of the wastes of desert land, of the interesting types of Arabs and their modes of life, and allow one time to converse briefly with a few European officials and date merchants who spend their lives in this out-of-the-way part of the world. The Persian Gulf is a body of water almost as long as Lakes Huron and Michigan together, and is noted for its low shelving beaches, the frequency and severity of its storms, and its intolerable summer heat. The only part of the year in which life in this region is at all comfortable is the winter season—from the first of December to the middle of April. During these months the climate resembles that of the desert regions of California or the winter climate of Egypt.

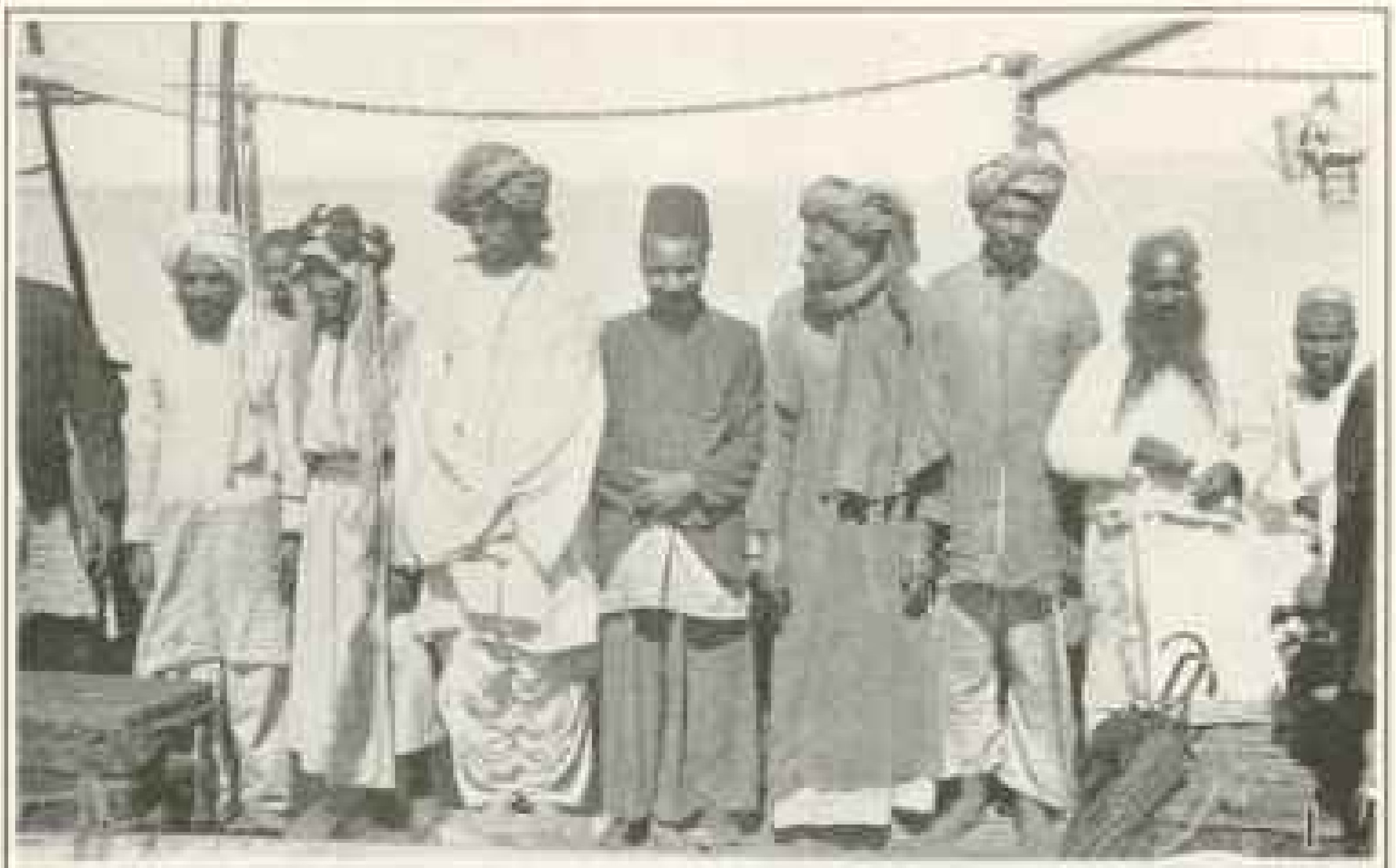
Photo by Fairchild

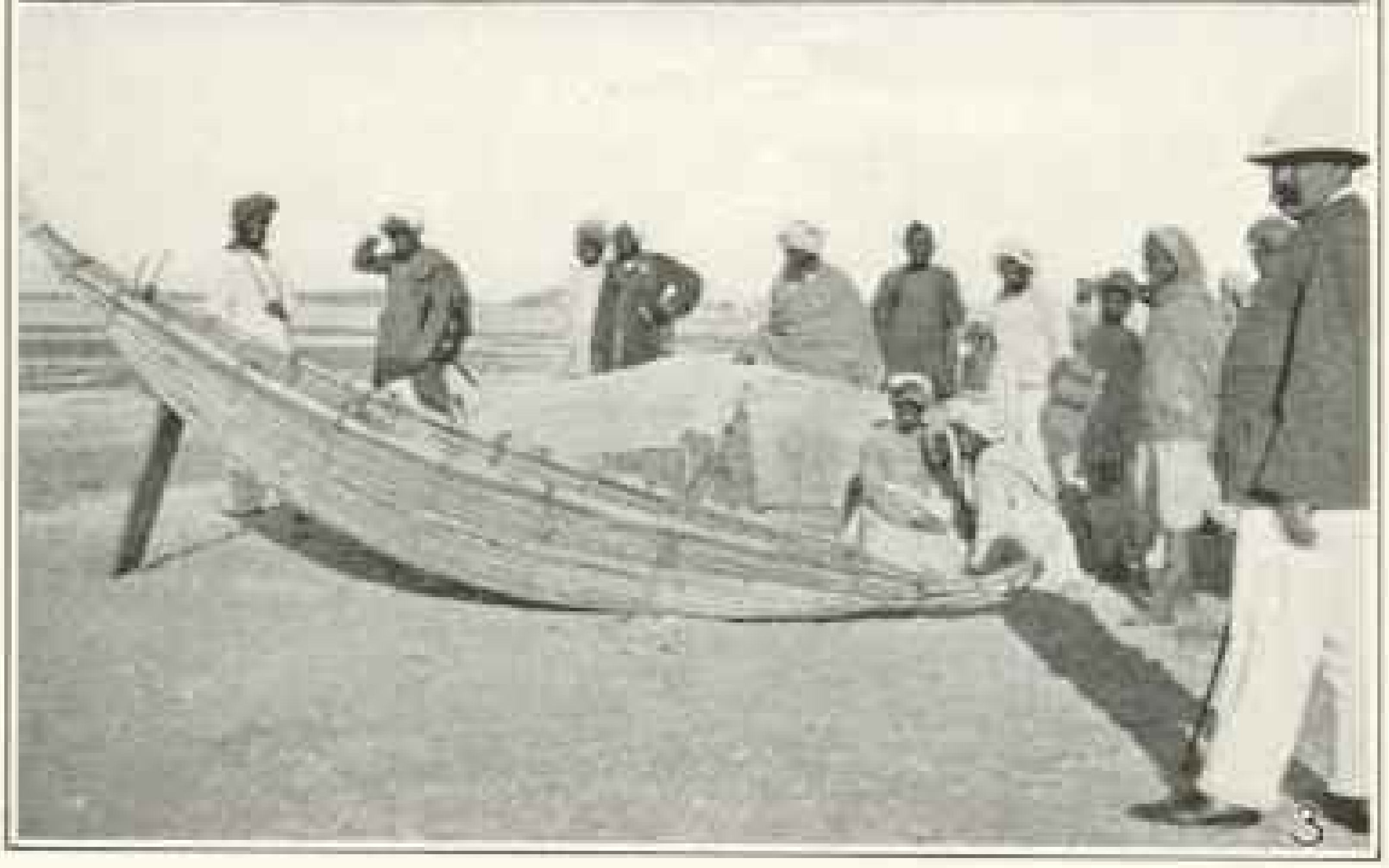
The House of a Wealthy Date Merchant

The family sleep on the high verandahs at night; at midday they withdraw to the inmost recess and close every opening by which the hot air can filter in.

During the winter season large numbers of Mohammedan pilgrims, coming from different provinces in India and different points in Persia, crowd the between-decks of the steamers with an interesting mixture of Oriental-looking baggage and picturesquely clad people. One realizes before the first night out that he is in the land of the "Arabian Nights". The old patriarchs who have made this pilgrimage to the Mecca of the Shia Mohammedans at Kerbela, near Bagdad, gather around them groups of younger, inexperienced pilgrims, and in Oriental cadences recite to them the thrilling story of the battle between the Prophet's grandsons at Kerbela. The wailing of the women and the sobbing of the men make one realize the religious fervor of these believers in the Prophet, and until the officers of the vessel inform you that it is the fashion to shed tears over this drama, no matter how many times it is repeated, you are inclined to attribute altogether too much sincerity to the emotion of these circles of listening pilgrims.

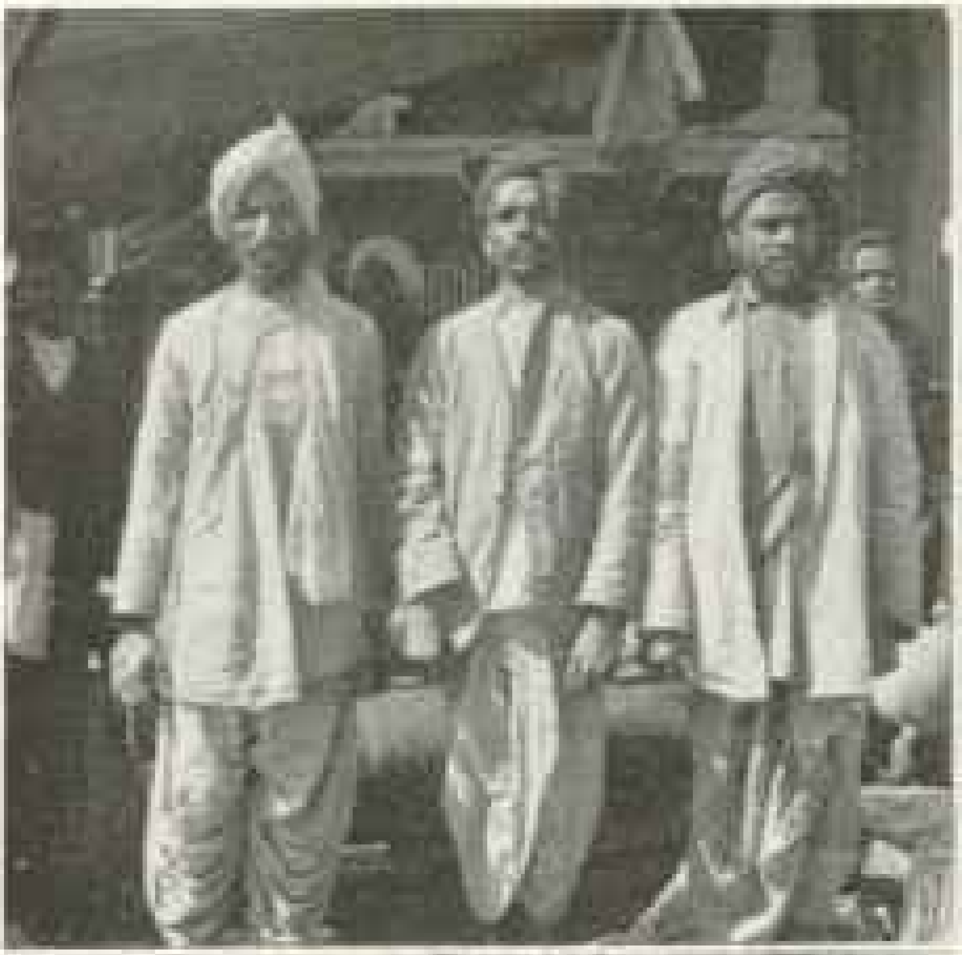
The first important port of call of the steamer is that of Muscat, nominally owned by the Sultan, but really a protectorate of England. As the boat casts anchor in the little harbor, surrounded on all sides by the rocky coast, the captain and chief engineer describe the discomforts of the summer season in this region. The shade temperatures, although no higher than in portions of this country during the daytime, surpass them by many degrees at night. A temperature of 110° at 4 o'clock in the morning, which is that recorded in Muscat, is not infrequent, and the few Europeans who are doomed to live there succeed in making life bearable by means of specially constructed fanning machines, which blow the air through wetted screens of grass roots. Muscat is one of the great shipping points for large quantities of dates, which are sent each autumn to the American markets. A few interesting bazaars, many strange types of costumes, and bits of old Arabian architecture make a short stay there interesting. The women of Muscat wear the most curious forms of mask that are to be seen in the Orient. They are richly embroidered squares of silk and wool, which cover the upper part of the face and leave the chin exposed, and in this respect they differ decidedly





Photos by Fairchild

1. A group of Mohammedans on a pilgrimage to Berbela.
2. Returning to the steamer at Jask.
3. As there are no trees and hence no wood on the shores of the Persian Gulf, the boats are made of the mid ribs of the leaves of the date palm. Such a boat is really a raft, it being impossible to keep out the water.



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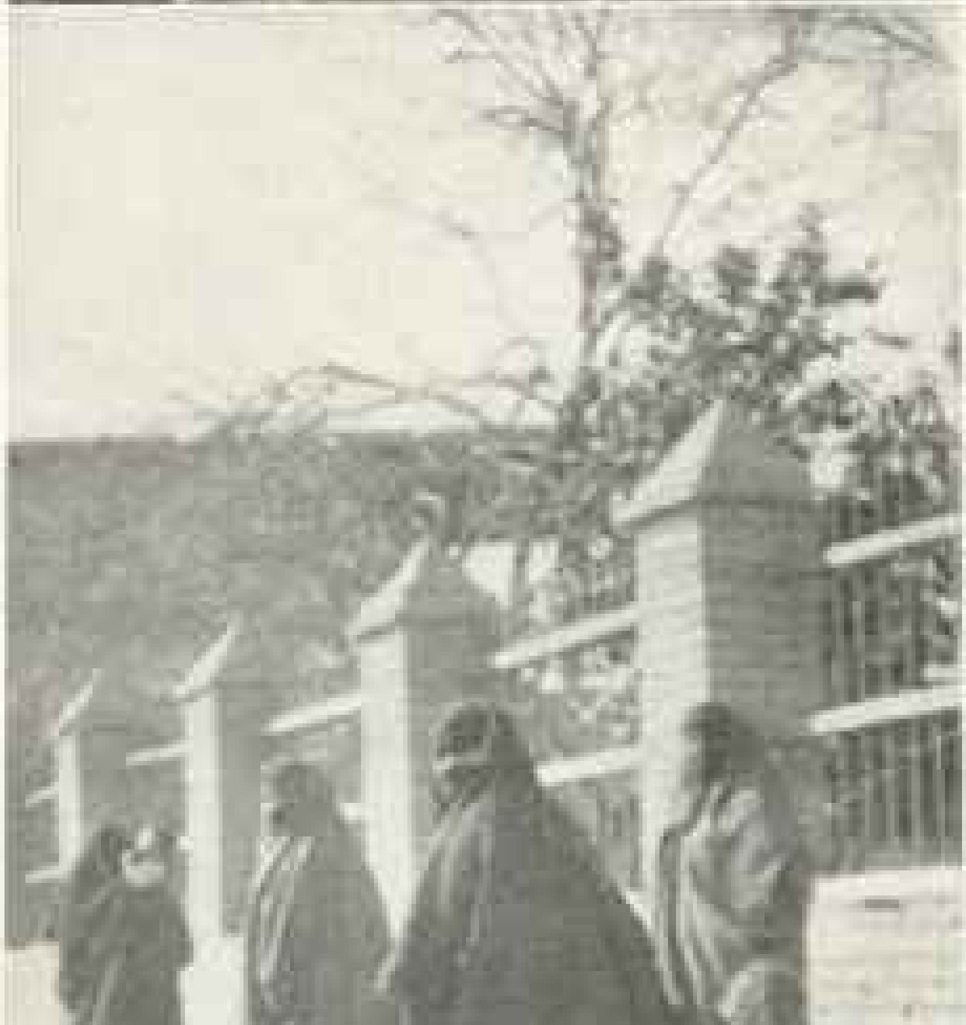

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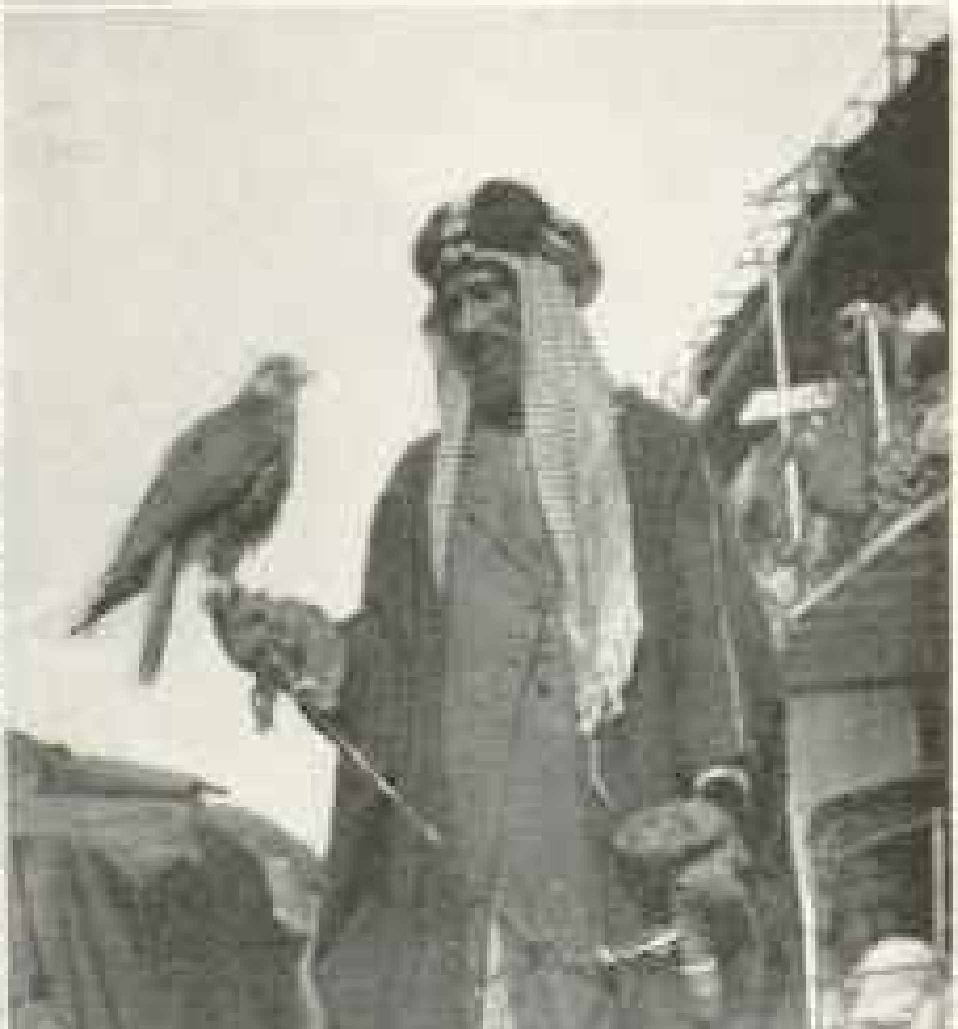

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Photos by Fairchild

1. Three Brahmins on the "Pemba." As their religion permits them to eat nothing cooked by non-Brahmin hands, these men ate apart from the several hundred Mohammedan pilgrims on the steamer.
2. The boat shown in No. 3 of the preceding page in the water.
3. Mohammedan women at Bagdad.
4. The falcon of an Arab skeik.

from the ordinary masks seen in Egypt and Algiers.

The next stop of the steamer was the little more than open roadstead of Jask, which has no further significance than that it is the station for the Persian-European Cable Company, and that through this station are passing at the present time a large portion of the cablegrams from the Orient. A visit to one of these out-of-the-world telegraph stations makes one realize how many men there are who are willing to bury themselves for a petty salary in a region where there are absolutely no trees or green things in sight except the few that are planted and carefully watered by hand, when they might be living lives of comfort elsewhere.

Nearly opposite Task lies the harbor of Bander Abbas, regarding which it is probable we will hear much more should Russia attempt, as it is hinted she intends doing, to make of this port a naval harbor. Wigham has pointed out, in his interesting book on this part of the world, that the harbor of Bander Abbas can be made into a first-class naval harbor, and this opinion seems to be shared by the captains of merchant vessels who for years have passed up and down the Gulf. Whichever power secures this harbor is believed by the European residents to hold the key of the Gulf. While a short stop there and a call upon the British consular agent were not sufficient to give the writer anything but the most superficial view of the situation, such a view would support the standpoint taken by Wigham in his work on the region.

Crossing the Gulf, a short stop was made at the pearl islands of Bahrein, from which such quantities of valuable pearls are shipped every year. These islands form a gateway to the interesting region of El Hasa, which has been so little modified by the rapid developments of other parts of the world that there is in use today, in the markets of El-Hofuf, a small coin worth a fraction of a penny originating in the 6th century, called the "toweela," and shaped like a short, bent piece of telegraph wire, upon which is stamped the Cufic characters of one of the Carmathian princes. As an agricultural explorer, I was disappointed not to be able to visit El Hasa for the reason that the most noted date of the Persian Gulf region, the so-called Khalass of Hassa, is cultivated in the plantations around the town of El-Hofuf.

Bushire, the next point touched, is the Persian Gulf port for Shiraz, but the heavy weather, which often makes landing difficult at most of these ports along the Gulf, prevented more than a few hours' visit to this comparatively uninteresting Persian town.

It would seem hard enough to the traveler to undergo the discomforts of a long voyage on an old-fashioned steamer of small tonnage in order to visit Mesopotamia, but the Turkish government demands, in addition, ten days quarantine at Busra, and, to any one who has seen the inside of a Turkish lazarette, seven days of imprisonment in such quarters might easily deter him from making the trip.

Busra, on the Shat-el-Arab, is surrounded by great date forests, which stretch for 70 miles up and down this great river. It is made up of the town lying on the river, in which the handful of Europeans live who carry on the date shipping business, and the old town of Busra itself, some distance inland, but connected with the river by the old Busra Canal. It has been called the Venice of the Orient because of its numerous canals, on which, in long, slender boats like gondolas, the inhabitants move from place to place. These boats, or *bellums*, are poled along by picturesquely clad natives, who, in their way, in quickness and skillfulness, resemble the gondoliers of Venice. The gay colors of these boats and their men, the bright cano-

Photo by Fairchild

A Canal Scene—Busra

pies, the orchards of date palms, the adobe houses with their latticed windows, and the boatloads of peculiar produce make this old Busra canal a most interesting sight. The few Europeans who live in Busra manage in the summer season to keep fairly cool by spending as many of the hours of daylight as possible in the darkened lower quarters of the Arab dwellings in which they live, and at night they make themselves comfortable on the roofs of the houses. A social club, with its outfit of tennis courts, seems to be the only amusement possible to those unfortunate enough to be obliged to live in this out-of-the-world place. The principal business is that of date shipping, and in the autumn season shipload after shipload of the fruit of the surrounding palm trees is dispatched to New York, if possible in time for the Thanksgiving market.

There are only two steamers plying up and down the historic Tigris, and possibly these might not be in existence were it not for the fact that the British government, at the close of the Crimean war, secured from Turkey the right to maintain three gunboats on the Tigris. One of these still remains and is to be seen opposite the British consulate in Bagdad. The other two have, with the consent of the Sultan, been replaced by side-wheel freight and passenger boats similar to those on the Mississippi, which are controlled by Lynch Brothers, of London, who make a handsome profit out of their almost complete monopoly of the Tigris River trade. Five days are necessary, with the best of success, to stem the strong spring current of the river from Busra to Bagdad. Its long reaches, sharp turns, and shifting sand banks make it a difficult river to navigate, and we had the experience, which is not unusual, of being turned completely around in our course by the strong current, against which for hours the feeble engine of the steamer made absolutely no headway. Although I had

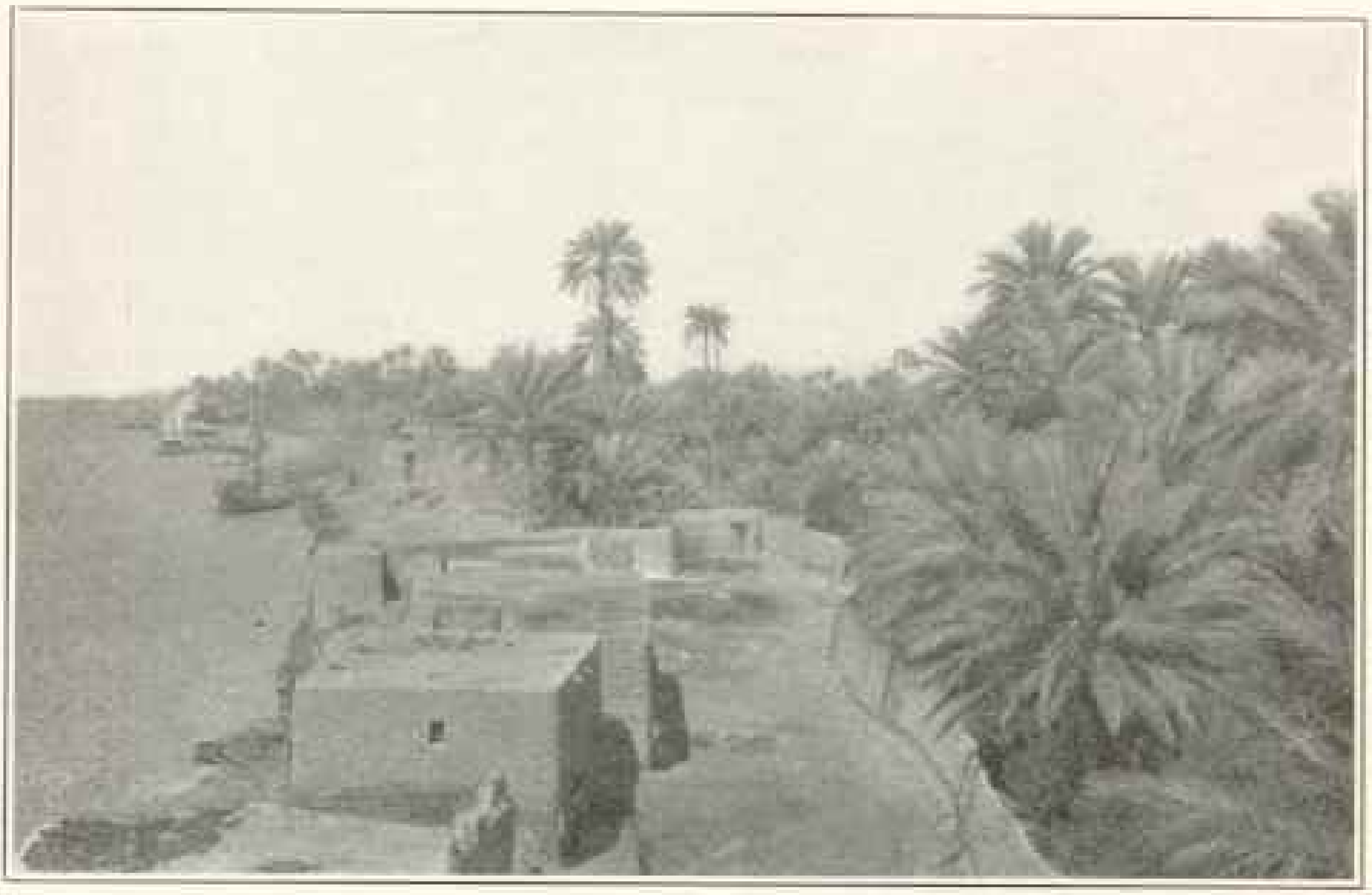
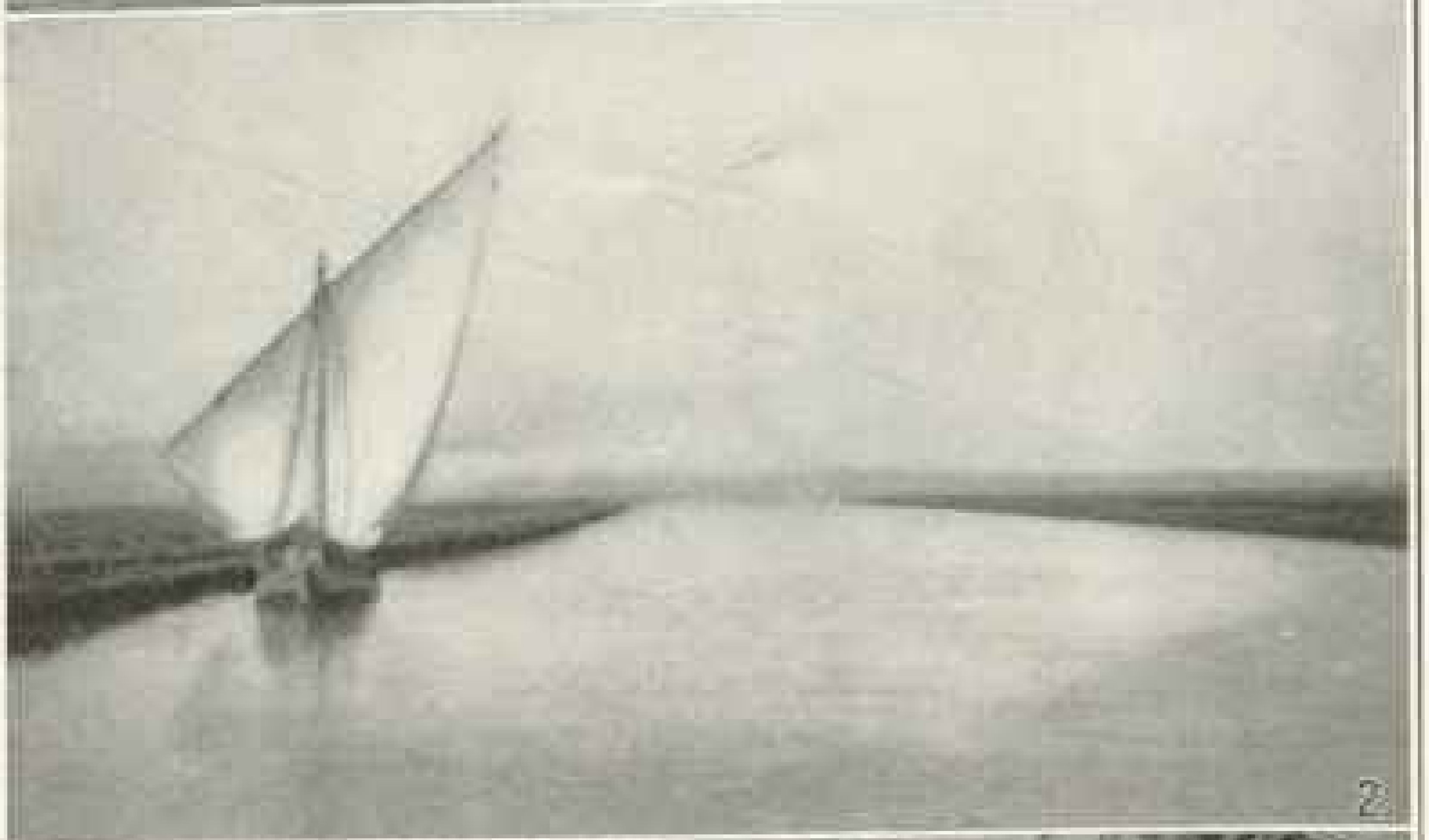


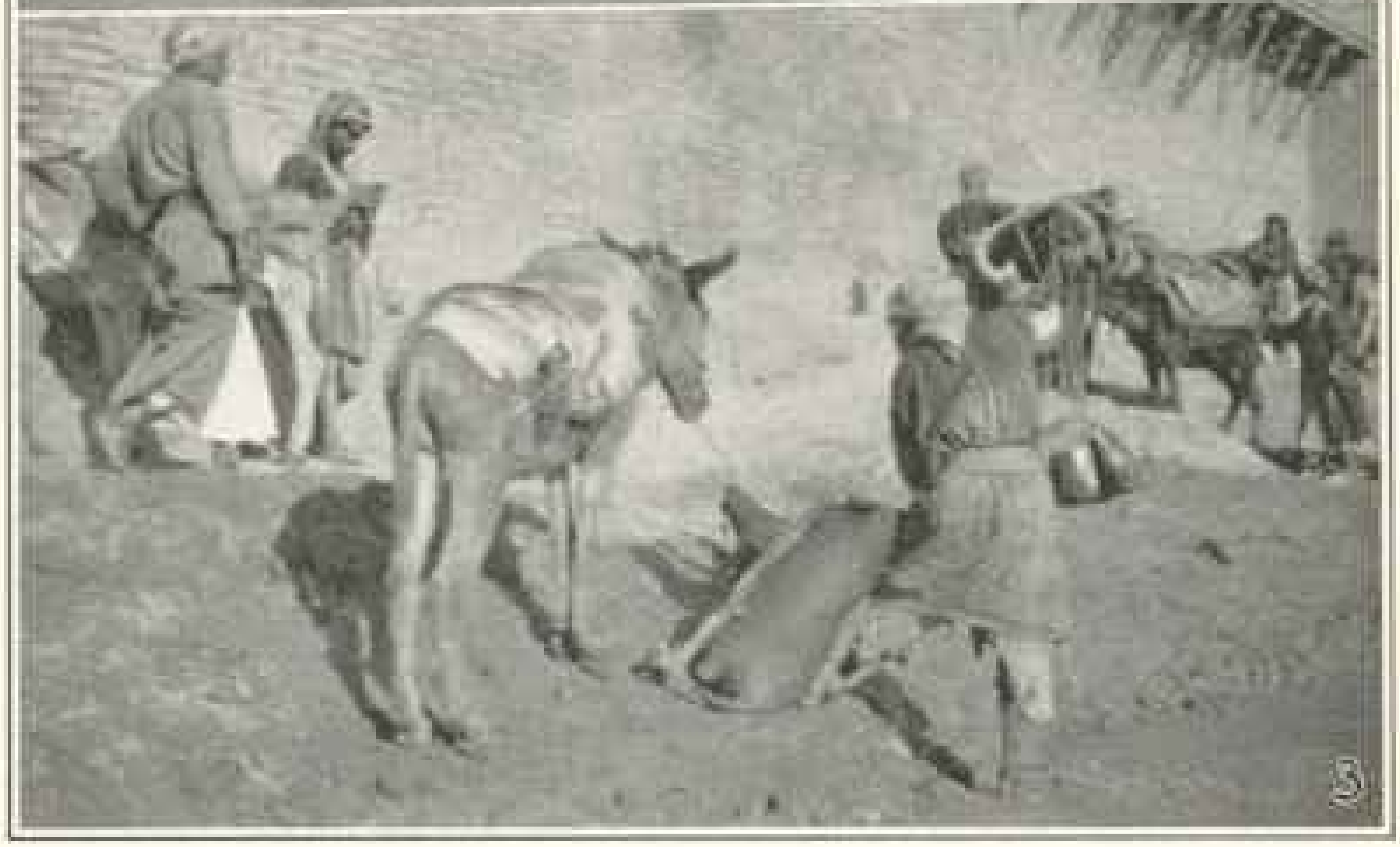
Photo by Fairchild

In the Suburbs of Bagdad, showing the Mud Houses and Date Palms

heard much of this apparently almost level plain of Mesopotamia, five days' journey through it could not but convince me of its vast extent. Stretching on all sides to the horizon was the almost treeless desert only a few feet above the level of the river. The soil, though variable with regard to the amount of alkali it contains, is as fine as the Nile silt, and not a stone or rock as large as a man's fist was seen. It is from this adobe clay that the Babylonians made the remarkable bricks upon which have been handed down to us in the cuneiform language the records of butcher and tailor bills of six thousand years ago. Running almost parallel, but not in sight of the river itself, are the ruins of the ancient Nahrwan canal, which recent investigations have shown irrigated at one time immense areas of this now desert waste. Sir Wm. Willcocks has shown that the destruction of this canal by the Tigris, in its gradually changing course across the delta, was perhaps the most potent factor in the downfall of the land of Babylon, and it is interesting to read his estimates, from the standpoint of his long Egyptian experience, of the necessary expenditure to rebuild and extend this old canal and bring under cultivation millions of acres of unutilized rich river silt.

Bagdad is so connected with the story of the "Arabian Nights" that even though its tumble-down houses and narrow streets would be disappointing in the extreme to any one looking for the Oriental splendor of those days of Haroun-al-Raschid, it is nevertheless so filled with curious sights and is so unaffected by the civilization of Europe that it can not fail to appeal to one in search of novel sensations. Its mosques,





Photos by Fairchild

1. The harbor of Muscat.

2. On the Tigris in early morning. The river winds through many miles of treeless desert (Mesopotamia), which hundreds of years ago was populous and prosperous. Two million acres of fertile soil could be easily reclaimed by a canal system.

3. The skin water bag of the traveler in the interior.

with their gilded or tiled domes, and its bazaars, with their mixture of silks, weapons, and embroideries; its thousands of dogs, which, like those of Constantinople, are a feature of the place, and, above all, the gay costumes of the Christian women, make a stay in Bagdad extremely interesting.

There is a small colony of Europeans in the place, which is composed of various nationalities, and life is made bearable by a club, tennis court, and golf links. The latter are possibly the most unique links in the world, being upon the buried mounds of former villages. Under the mounds over which the golfers play lie buried, near the surface even, the skeletons and funereal jars of former generations, and it is not an uncommon thing for the golf player to strike with his golf club the shin-bone or vertebra of some half-decayed skeleton.

Many questions were under discussion by the European population of Bagdad during my short stay there, but naturally that relating to the new railway, which has been projected from Aleppo to Bagdad and as far as the Gulf, was one of the most important. The view most prevalent—at least the view presented to me—was a pessimistic one. The people acquainted with the sparsely inhabited region through which the railway must necessarily run for hundreds of miles, predicted that it would be impossible for such a railway to pay, and it was repeatedly pointed out that this great region would require for its development not only the building of canals, but the importation of large numbers of settlers, either from India or from other portions of Arabia, and their colonization along the line of the railway. What such a railway could

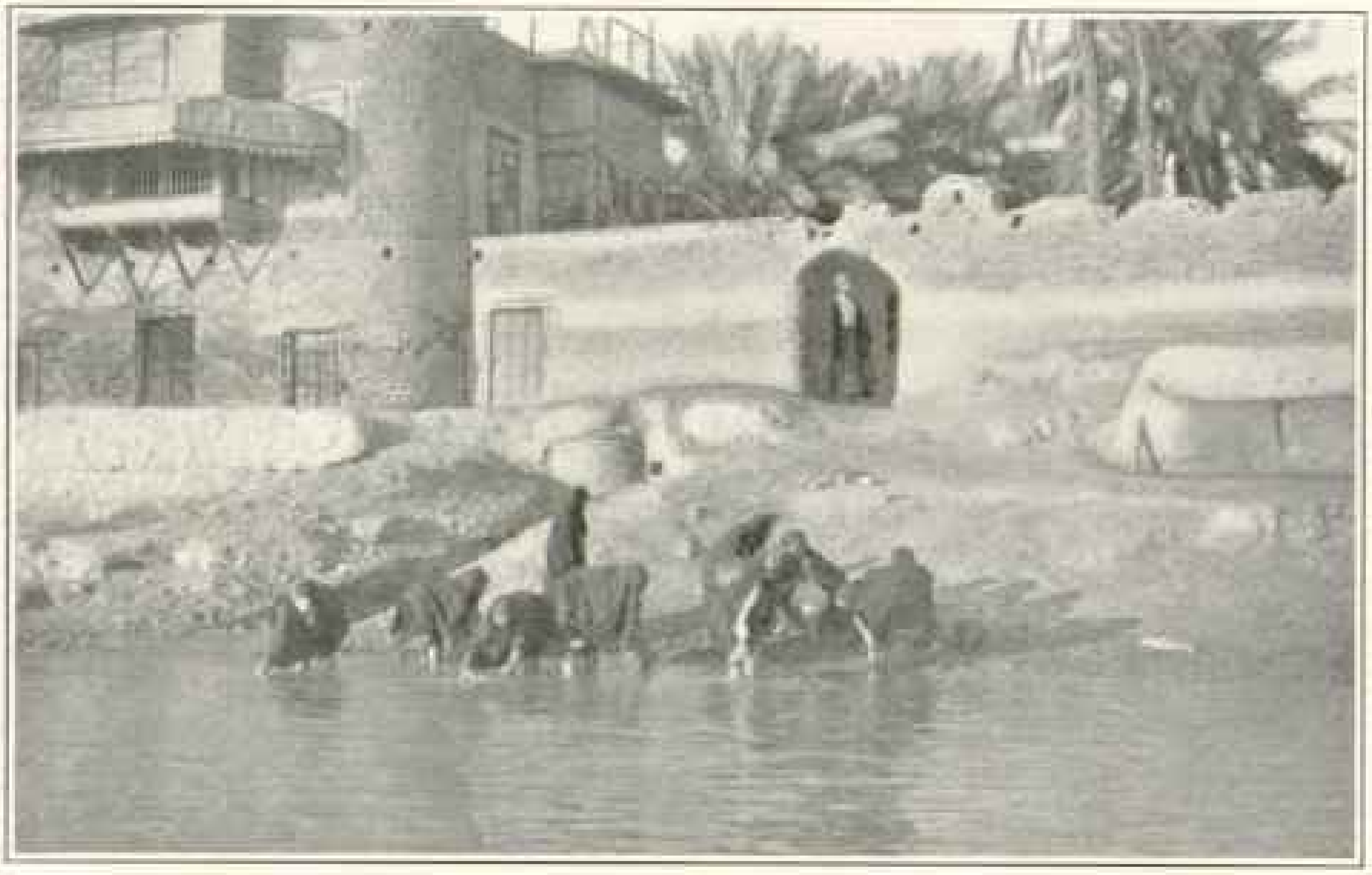


Photo by Fairchild

Women Filling Their Water Jugs in the Tigris—Bagdad.

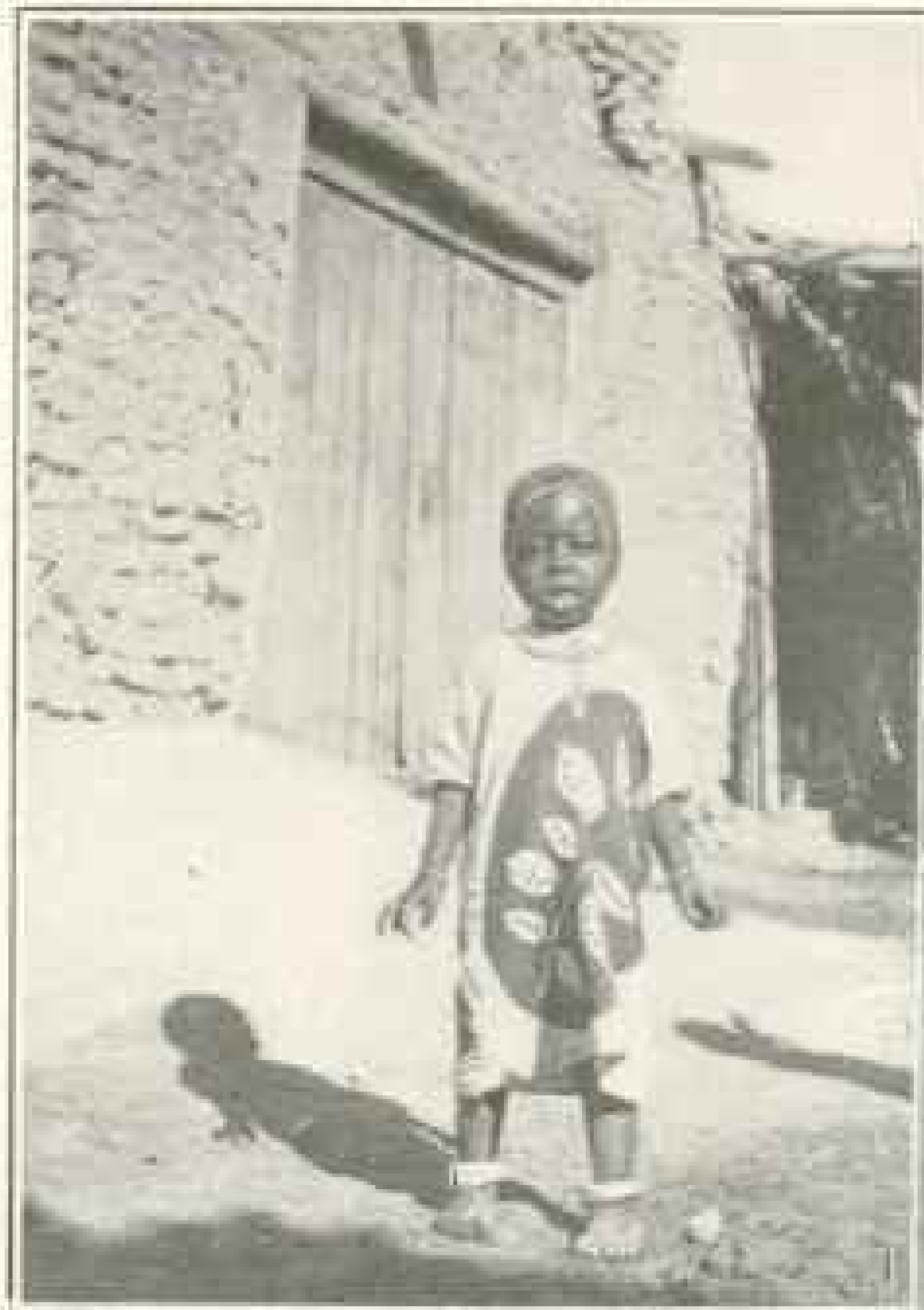
find immediately to make it pay, is difficult to discover, but to one familiar with the way in which our great West has been peopled, and the progress which is being made in matters of irrigation all over the world, the scheme of settling such portions of the Tigris Valley as can be irrigated does not seem a chimerical one. Under the present rule, however, it would be difficult to develop the country, as the hindrances to transportation, the methods of taxation, and the hundred and one difficulties of administration which characterize Turkish rule would be discouraging in the extreme, to any American capitalist at least.

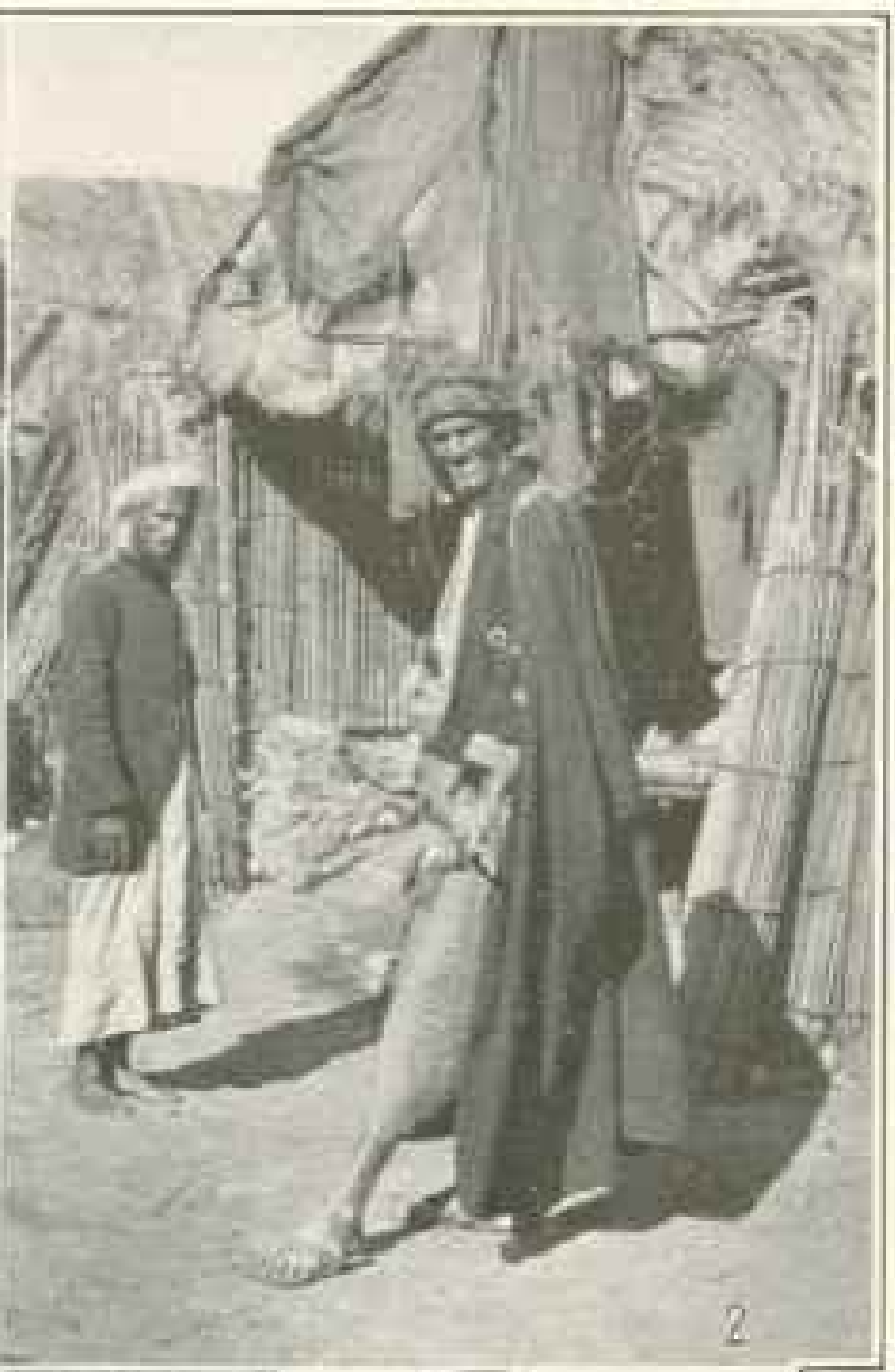
So far as climate is concerned, however, the region appears to be as inhabitable as many portions of Arizona and California, the winters being delightfully pleasant and the summers no warmer than those of the desert regions of the Southwest. That the soil comprising large areas of this region is suited to the cultivation of many valuable crops is evident. In the small garden, one of the largest on the Tigris, however, of the Sheik Abdul Kader Kederry, I found growing a large variety of fruit and other economic plants, and, so far as the superficial observations of the writer are concerned, there appears to be no reason why any plant which grows in the Nile Valley and which can be cultivated in Arizona and southern California will not grow satisfactorily in that vast region. The cotton industry alone might find a very congenial home in that country, and from the samples examined it seems probable that a very good quality of Egyptian cotton could be produced there. As for the patches of alkaline soil, some of which are doubtless of large size, the question of their utilization would depend entirely upon the amount of irrigation water which could be furnished by the Tigris River, as the experiments in the delta region of the Nile have shown conclusively how easy it is to wash salt out of the soil sufficiently to enable profitable crops to be grown.

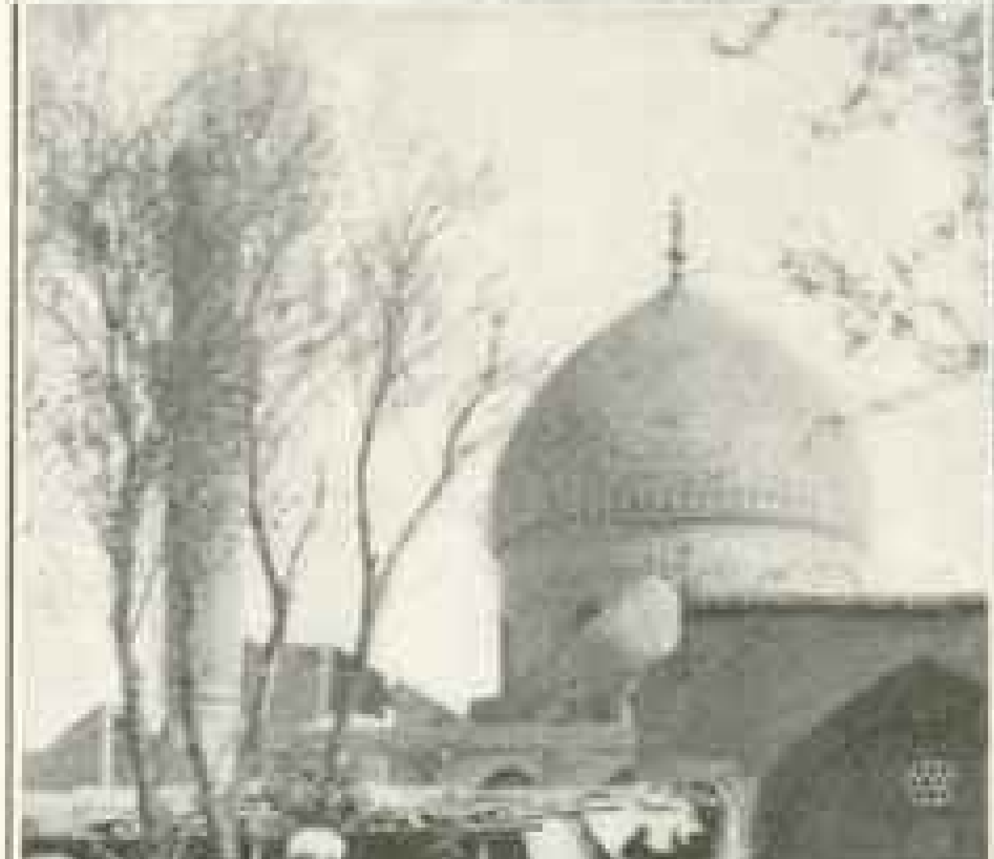
An examination of the wheat markets of Busra and Bagdad convinced the writer that excellent hard wheats can be grown in that region. Although it is probable that the varieties best suited to cultivation there would be those most in demand for macaroni-making, some soft varieties of good quality can doubtless be cultivated.

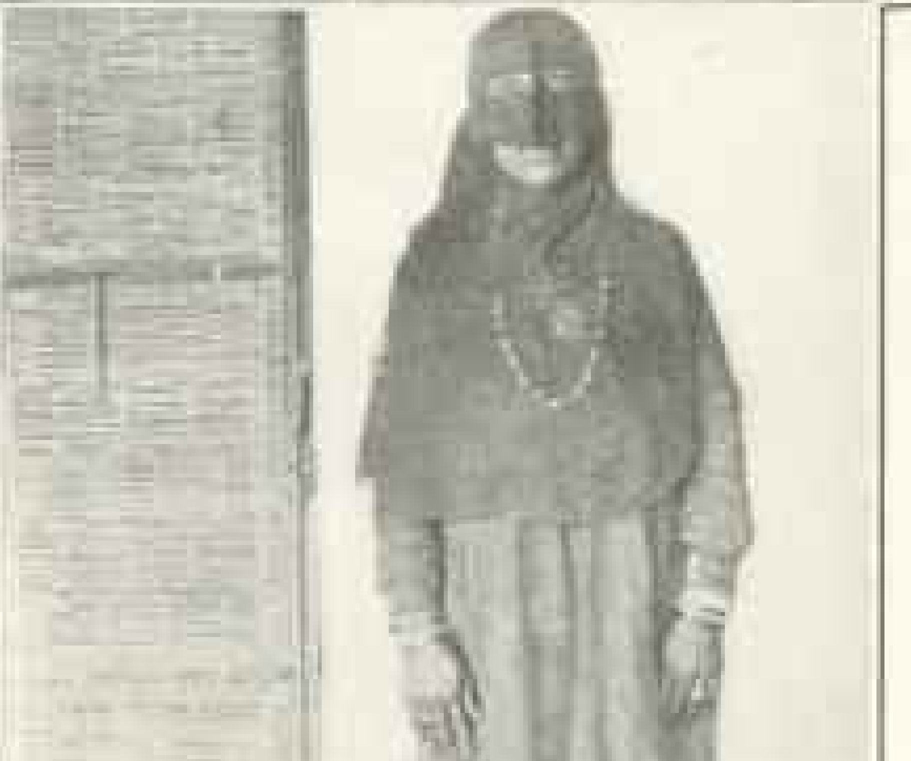
The commonest—in fact, almost the only—fodder crop of the region is the alfalfa, or "Djet," which is, without doubt, the widest distributed and most important fodder crop in the world. It is here grown, however, in garden fashion, small patches of a fraction of an acre seeming amply sufficient to supply the demand for forage for the donkeys and small herds of cattle which are kept by the natives along the river. In April the herbage of the desert is in its most satisfactory condition for grazing, and numerous small herds of cattle were seen from time to time along the banks of the river; but their condition indicated a lack of sufficient food, and I could not but compare these herds of half-starved animals with the well-nourished stock of the Argentine alfalfa fields or the tethered rows of sleek-looking Oriental cattle in the Berseem fields along the Nile. What the possibilities for stock-raising are in that region will depend entirely upon the amount of alfalfa and such other crops, as Alexandrian clover, that can be successfully grown. It is certain that races of animals can be found which will withstand admirably the scorching summer heat of the country.

There is one feature of Bagdad life which, though apparently small in itself, assumes a real importance to those who live in that Oriental town. It is the Bagdad boil. This boil deserves a more serious name, for it is generally more inconvenient and disagreeable than









Photos by Fairchild

1. A slave boy. His heavy anklets and bracelets are signs that he is held in bondage.
2. A date merchant at Busra.
3. A mosque in Bagdad.
4. A woman of Muscat, showing the peculiar veil used by the women of that region. The veil is elaborately embroidered.

a carbuncle, for it often attains unusual proportions and commonly lasts for eight or nine months. Every inhabitant of Bagdad is said, sooner or later, to suffer from one of these boils, Europeans and Arabians alike being susceptible to it; and so universal is it that old inhabitants of the region say that they can always tell whether a man has lived in Bagdad or not by the scar which it leaves somewhere on his body. In order to have a definite idea of its nature, the writer called at the Turkish hospital and interrogated the Turkish doctor in charge as to its nature. After very politely exhibiting a number of cases he gave me his opinion as to its cause: *"C'est l'eau, le climat et le soleil, Monsieur."* In the opinion, however, of Dr Ramsey, the resident English physician of the place, this Bagdad boil is an infection arising from the sting or bite of an insect which he describes as a species of fly, and he recounted his own personal experience, in which he was conscious of the bite of this insect on the very spot on his forearm where the boil ultimately developed. This Bagdad boil would form a very interesting problem for some bacteriologist who was willing

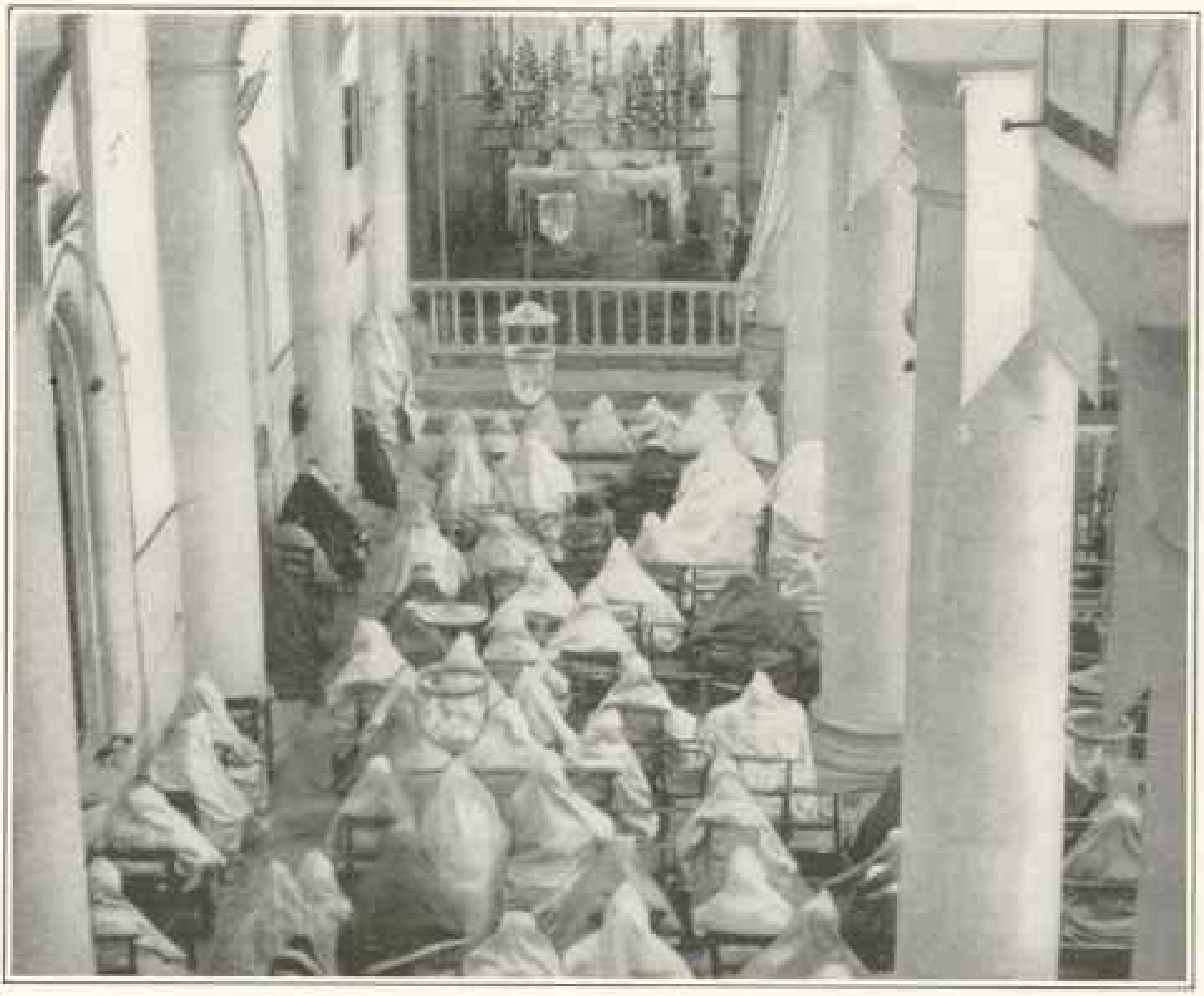


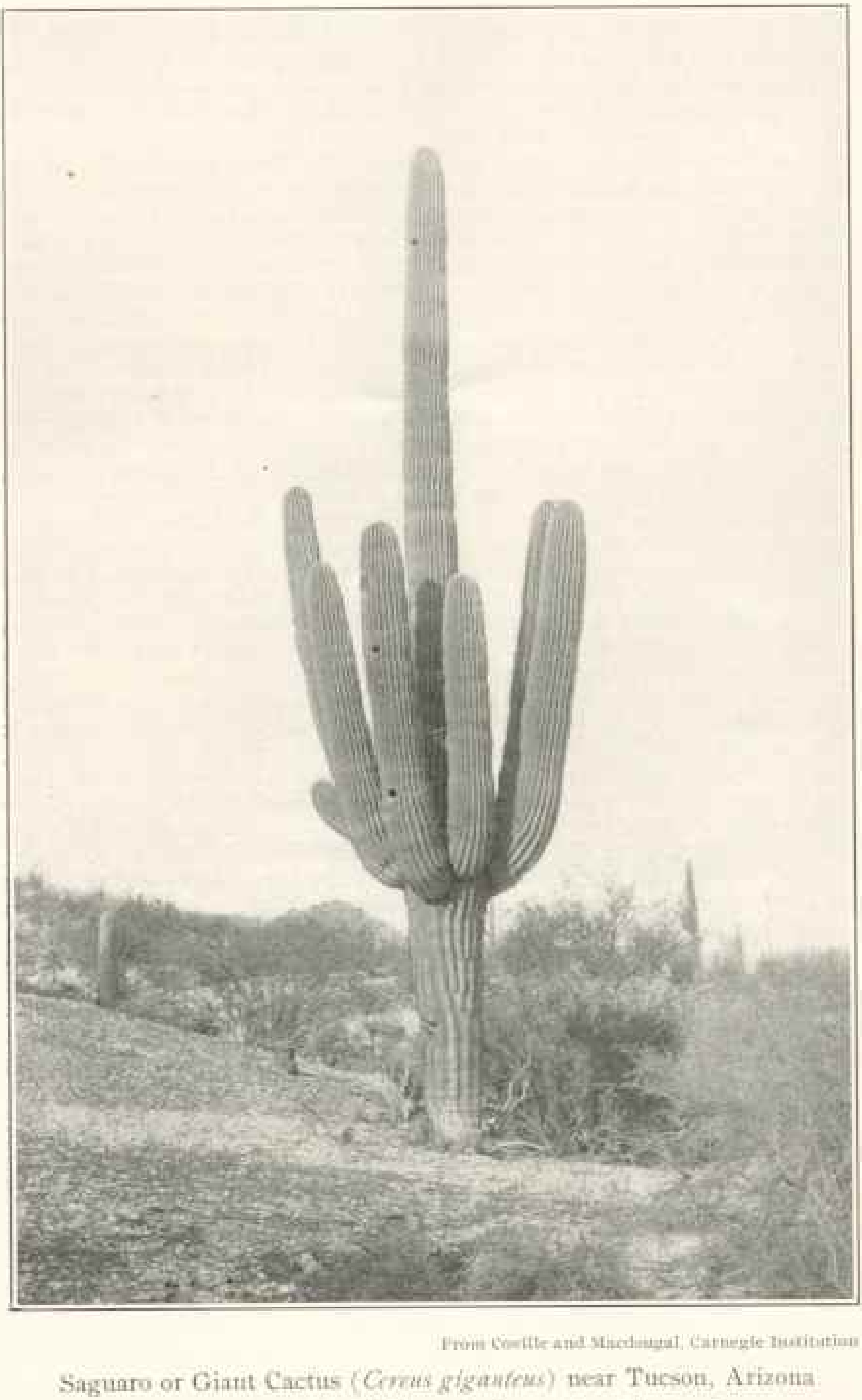
Photo by Fairchild

Women at Worship in a Church—Bagdad. (See page 151) to leave the comfort of his laboratory and make the necessary trip to Bagdad. It is possible that since the writer's trip to the region the question has been thoroughly investigated.

It may be a disappointment to any one who should chance to read this short article, that little reference is made to the buried cities of Babylon and Nineveh, which are located in Mesopotamia, but such a disappointment can not compare with that of the traveler who was prevented, by lack of time, from visiting these historically interesting places. If one is to judge, however, from the descriptions which are given by the inhabitants of Bagdad, a trip to the ruins of Babylon can not compare in interest with the excursion to Sakkara or a visit to any one of the important temples of Egypt; mounds of desert sand, in which German assyriologists have made numerous excavations, and the almost characterless remains of the so-called Tower of Babel, being practically all that the drifting sands have left of that once great metropolis. More interesting, perhaps, would have been a visit to Kerbela, the Mecca of the Shia Mohammedans, which, although insignificant in size as compared with the real Mecca, must give one a clear idea of the nature of these remarkable pilgrimages.

While in Bagdad it was my good fortune to visit one of the Christian churches on a Sunday morning, and, although as a traveler in the Orient I have seen many gay pageants of Siam, Japan, and India, no color scheme can compare with a churchful of Bagdad women, clad in their heavy silk *izars*. This *izar* of Bagdad differs from the garment generally worn by Mohammedan women in being dyed with the most gorgeous but delicate shades of pink, lavender, blue, and mauve, and in having woven into this delicately colored background, bold patterns or bands of gold and silver thread. The ample folds of this garment of thick, heavy silk, the broad surfaces of color when seen in masses, as I saw them from the choir loft of this Bagdad church, resembled, as the sunlight streamed in upon them through the plain glass windows, the color effects produced by a field of gigantic poppies. To one whose eyes are used to the infinite details of Parisian costumes, it is worth a trip to Bagdad to see such a sight as a churchful of Bagdad women.

Through the hearty coöperation of the American vice-consul in Bagdad, Mr Rudolph Hurner, and the very kind assistance of Mr H. P. Chalk, of Busra, I was able to get from the various Arab sheiks and date-planters a collection of young suckers of the most delicious date varieties of this great date-growing region. These were brought down the river, packed in Bombay, shipped to New York, and are many of them now growing in the coöperative date garden of Arizona as the gift of Mr Barbour Lathrop, of Chicago, to the American inhabitants of the arid Southwest. That date cultivation in this country is to be a success is indicated by the history of the successful introduction of many other foreign fruits and vegetables, and it is hoped that, as one of the results of this expedition, American tables may some day be supplied with those delicious varieties of Persian dates which are too delicate to bear the long shipment from the Tigris Valley to this country.



From Coville and Macdougal, Carnegie Institution

Saguaro or Giant Cactus (*Cereus giganteus*) near Tucson, Arizona

About 40 feet high. Birds nest in the cavities of the trunk

THE AMERICAN DESERTS

THE series of pictures on pages 152–161 illustrate the marvelous strength of desert plants. The size and luxuriance of the plants prove their wonderful vigor; but we are at a loss to explain the source or reason of their prosperity in regions where only a few inches of water fall during the year, and that little is immediately drunk up by the torrid sun. What enables the yucca (page 158) to thrust its head through thirty feet of gypsum sand, or the barrel cactus (page 158) to store enormous quantities of water, and to hold the water for months, perhaps years, or the sumach (page 156) to cling so tenaciously to its ground when everything else is swept away, are questions which none can satisfactorily answer. No less marvelous and inexplicable are the mesquite shrub, which sometimes has roots over fifty feet long, and other desert plants whose hairy coverings and resinous coatings prevent the evaporation of moisture.

On his return from the Death Valley expedition in 1891, Mr Frederick V. Coville was so impressed with the necessity of thoroughly understanding the strength of desert plants that he planned the establishment of a desert botanical laboratory. His botanical explorations in the Death Valley had enabled him to recognize the major problems of such an investigation, and to outline plans for further researches. The importance of such work was seen at once, but it required much more time and money than were available. When the Carnegie Institution was established Mr Coville presented his long-cherished project. The board approved the plan and made a grant to build a laboratory at Tucson and to carry on researches at this point. The experiments, directed by Mr Coville and Dr D. T. MacDougal, are under the immediate care of Dr W. A. Cannon, as resident investigator, and their object at present is to investigate the special devices of desert plants for the absorption and storage of water and for resisting substrata of unusual composition, like the gypsum sands of the Tularosa Desert.

A complete solution of the mysterious strength of desert plants will prove of great economic value to the United States aside from the important information it will give regarding the fundamental processes of protoplasm. In former times bands of roaming Indians inhabited the desert regions of the southwest. They lived in comparative abundance, and yet the country was no less arid than it is today. Doubtless they obtained food from the plants of the desert just as easily as the Papago Indian shown on page 158 is obtaining drinking water from the barrel cactus. White men can do likewise as soon as they understand these plants, and will find many practical uses for the cactus and yucca. An understanding of the source of strength of desert plants will also enable the farmer who irrigates his semi-arid land to judge how much water to apply and how often in order to gain the best results. It will also help him to develop alkali and drouth-resistant types and thus to reclaim new areas.

The first report of the laboratory has been published by the Carnegie Institution.* It describes a systematic tour of the deserts by Messrs Coville and MacDougal in 1903 and gives a useful account of the characteristic vegetation of the different deserts. It is superbly illustrated with 29 plates, from which those given in this abstract are selected. Tucson was chosen as the site of the laboratory because it has a climate of a thoroughly desert character and a rich

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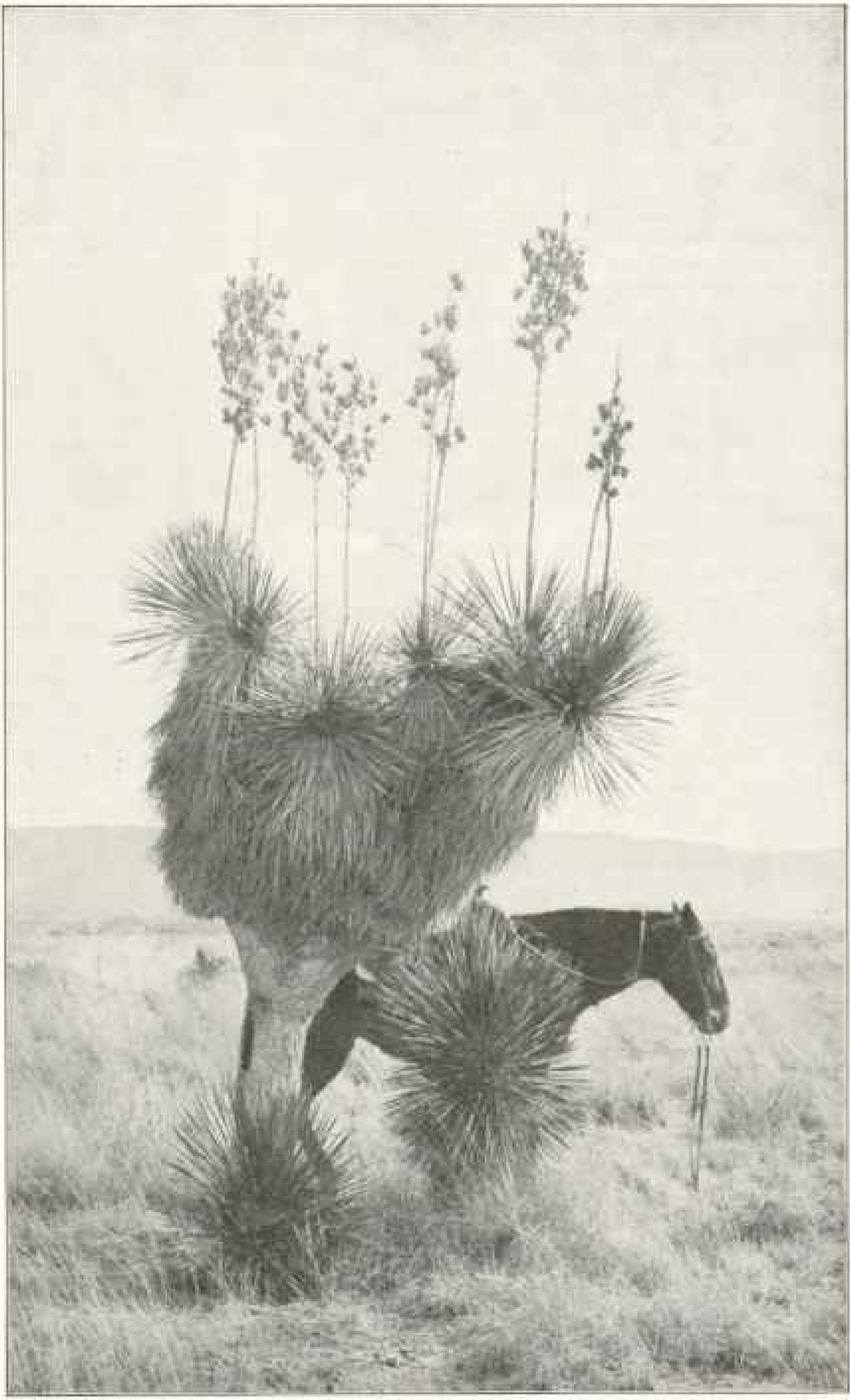
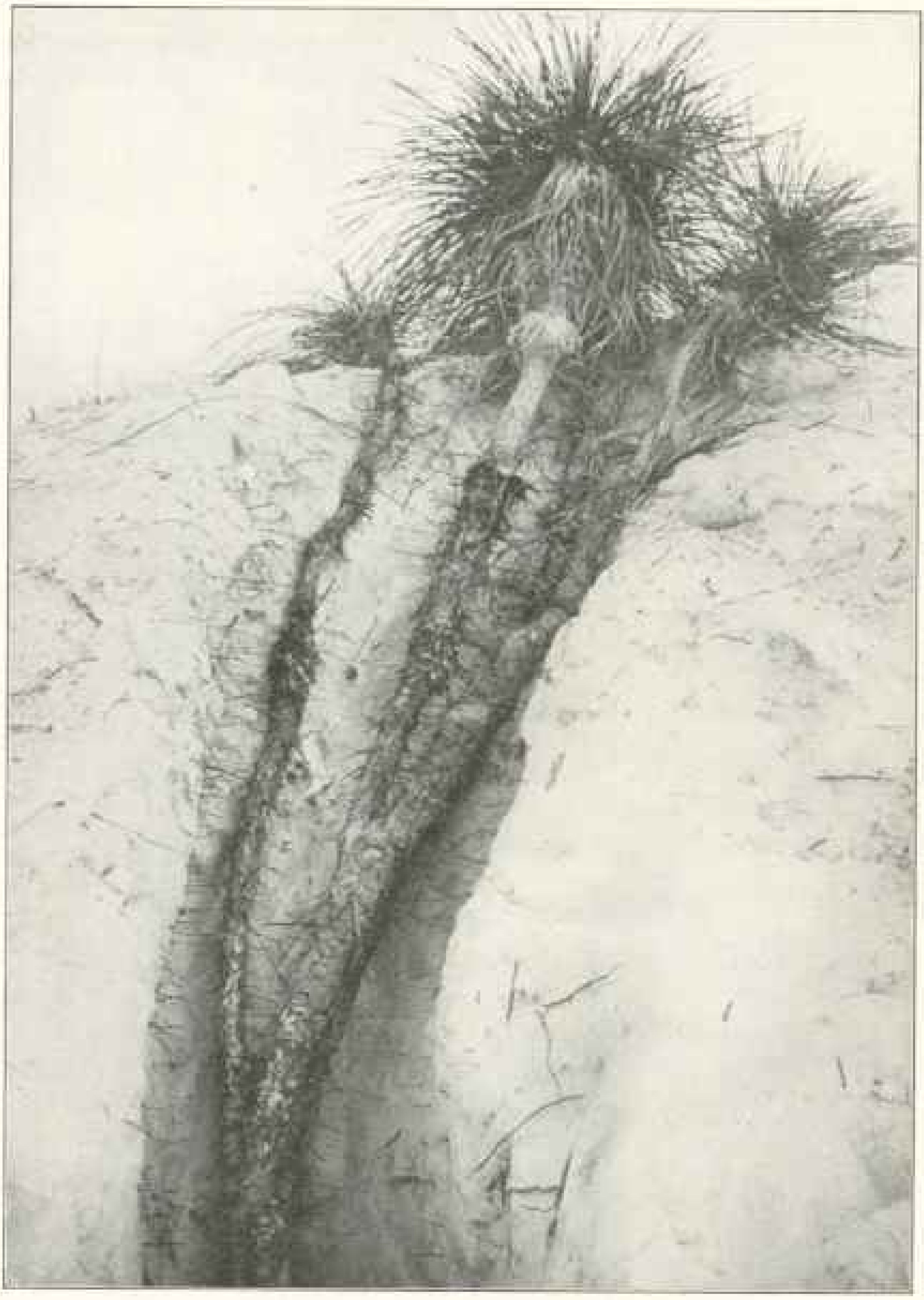
* Desert Botanical Laboratory of the Carnegie Institution. By Frederick V. Coville and D. T. MacDougal, Washington, Carnegie Institution, 1903.



From Coville and MacDougal, Carnegie Institution

Tree Yucca (*Yucca radiosa*) in the Tularosa Desert, New Mexico

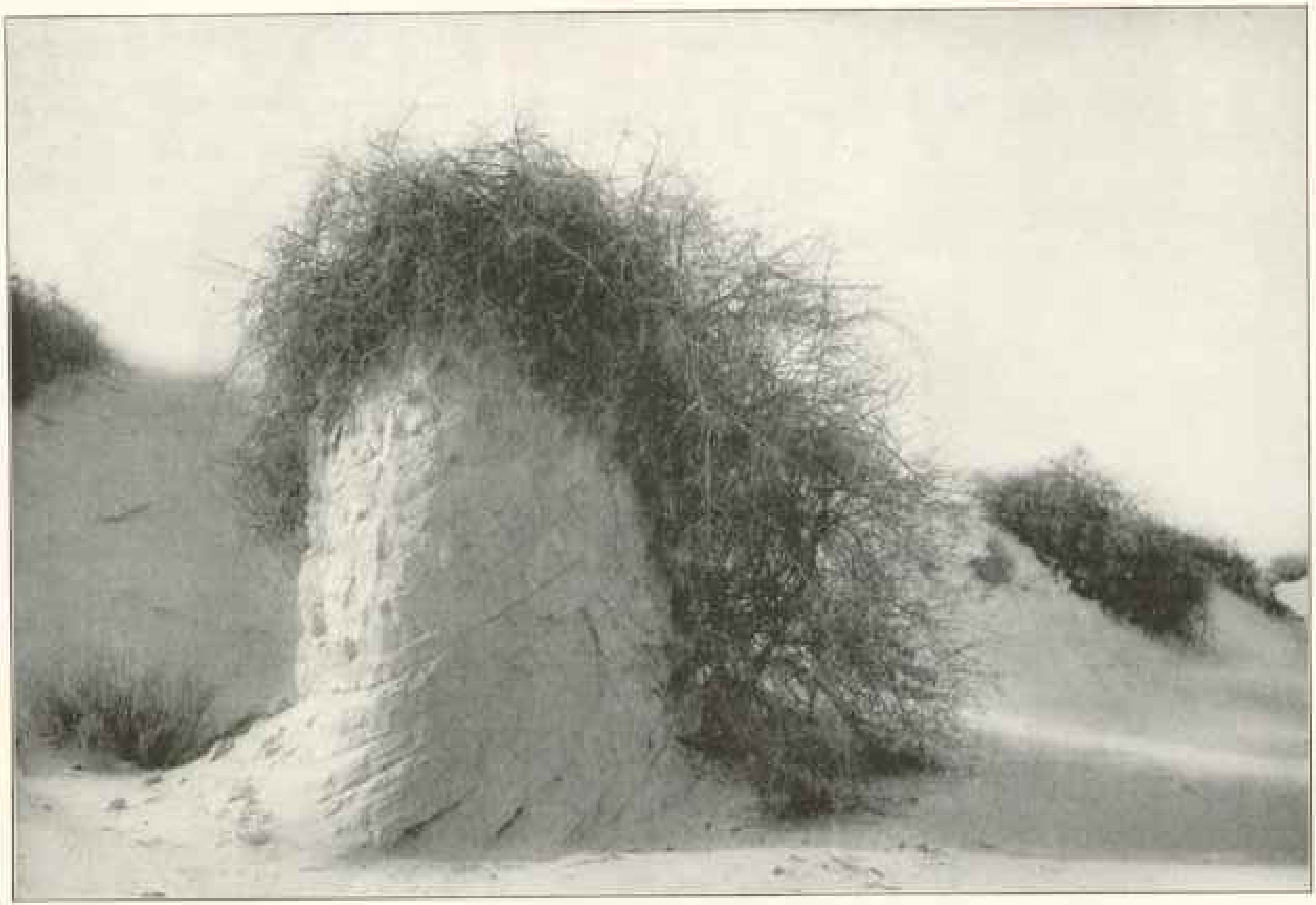
The large plant, which is in fruit, has lost some of its lower leaves by the nibbling and rubbing of cattle. The two small plants are younger specimens of the same species.



From Coville and MacDougal, Carnegie Institution

Tree Yucca (*Yucca radiosa*) Growing Up Through a Dune 30 Feet High.
White Sands, New Mexico

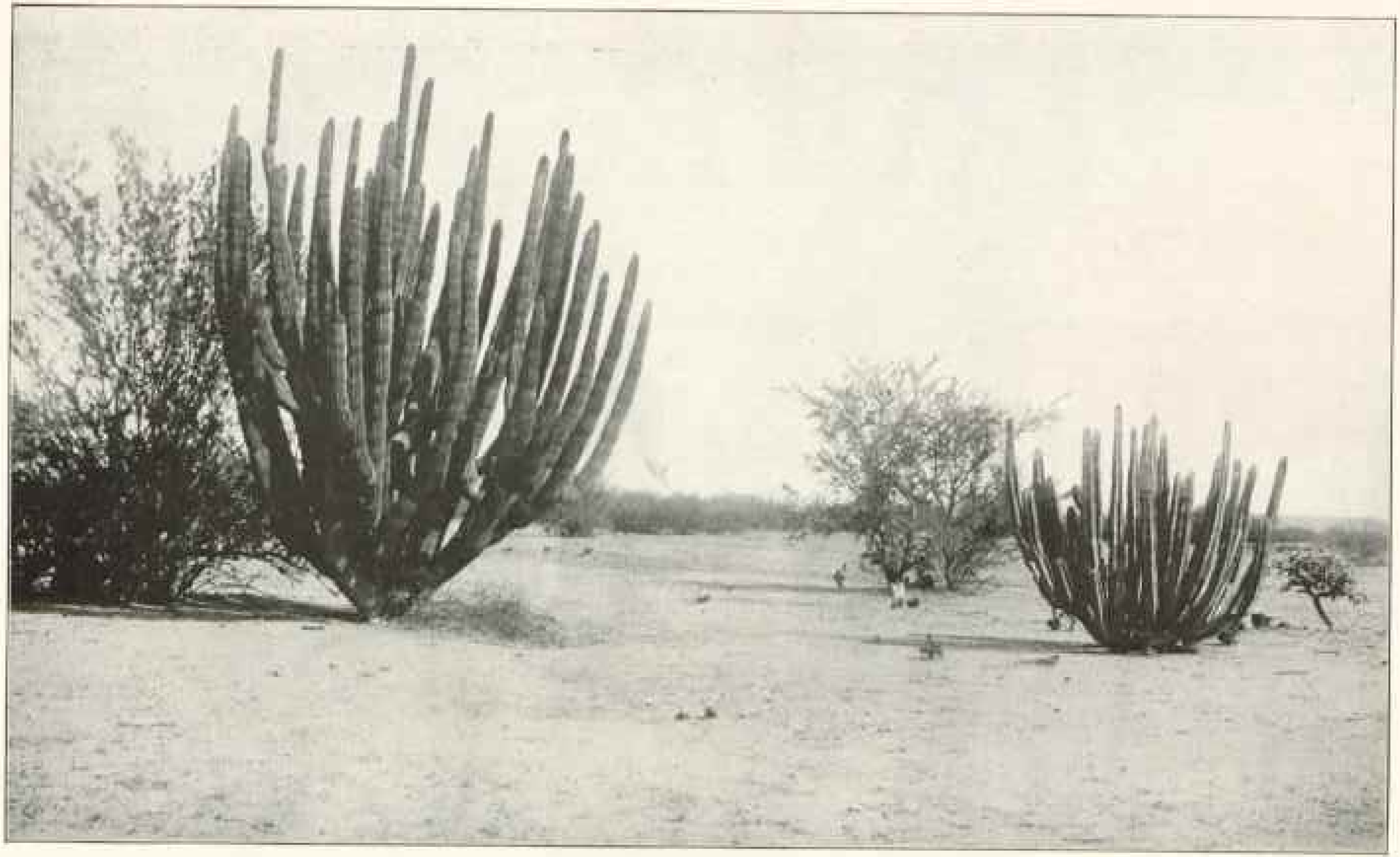
A few of the upper circles of leaf bases can be seen in the picture. (See page 153)



From Coville and MacDougal, Carnegie Institution

Sand Column, in the White Sands, New Mexico, Caused by the Protection Afforded by the Three-leaved Sumac Growing Over It

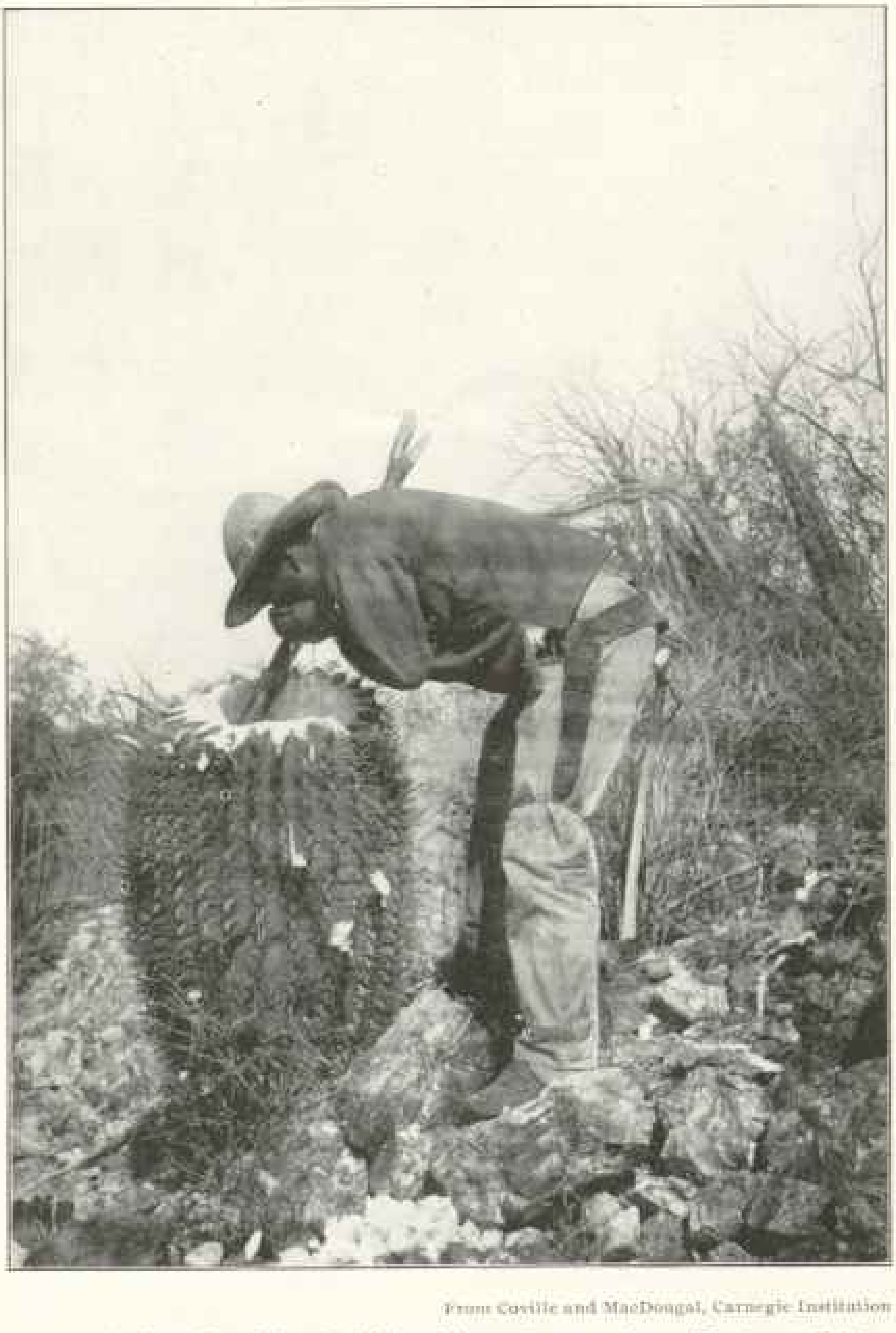
Distance from base to summit of column about 15 feet. A striking example of the binding and protecting strength of this bush. It is the most characteristic plant of the White Sand dunes



From Coville and MacDougal, Carnegie Institution

Vegetation of the Sonora Desert, near Torres, Mexico

The cactus on the left is the pitahaya (*Cereus thurberi*), about 20 feet high; the one on the right is *Cereus schottii*



From Coville and MacDougal, Carnegie Institution

Papago Indian Obtaining Drinking Water from a Barrel Cactus (*Echinocactus emoryi*) West of Torres, Mexico. (See page 159) flora and is centrally located with reference to the deserts of Texas, Chihuahua, New Mexico, California, and Sonora. The town has a population of 10,000, who have presented the laboratory with a convenient site and have aided it in many other ways.

Tucson, for centuries before the landing of Columbus, was one of the permanent settlements of the ancestors of the Papago Indians of today. These Indians were partly migratory, moving southward in autumn to hunt in the sierras during the winter and returning in spring to replant their crops.

They scoured the Sonoran plains for chance water-holes, as well as more permanent waters, carrying religiously hoarded seeds; they chased rainstorms seen from commanding peaks for scores, if not hundreds, of miles, and wherever they found standing or running water, or even damp soil, they planted their seeds, guarded and cultivated the growing plants with infinite patience, and, after carefully harvesting the crop, planted some of the finest seeds as oblations and preserved others against the ensuing season, so that the crop plants were both distributed and improved from year to year.

It was among the desert hills west of Torres that the writers had an opportunity to see a Papago Indian extract from a bisnaga (*Echinocactus emoryi*), or barrel cactus, water with which to quench his thirst. He cut the top from a plant about five feet high, and with a blunt stake of palo verde pounded to a pulp the upper six or eight inches of white flesh in the standing trunk. From this, handful by handful, he squeezed the water into the bowl he had made in the top of the trunk, throwing the discarded pulp on the ground. By this process he secured two or three quarts of clear water, slightly salty and slightly bitter to the taste, but of far better quality than some of the water a desert traveler is occasionally compelled to use. The Papago, dipping this water up in his hands, drank it with evident pleasure and said that his people were accustomed, not only to secure their drinking water in this way in times of extreme drouth, but that they used it also to mix their meal preparatory to cooking it into bread.

WHAT IS A DESERT?

The current conceptions of deserts are neither adequate nor correct if the descriptions in the best dictionaries and cyclopedias are to be taken as an index. A work of wide circulation and use defines a desert as "A region that is wholly or approximately without vegetation. Such regions are rainless, usually sandy, and commonly not habitable."

The insufficiency of the above description rests upon faulty observations and upon the failure to recognize the fact that the habitability of a region is no criterion of its arid character. The development of modern methods of transportation has made possible the maintenance of dwellings and towns with a considerable population at one or even two hundred miles from the nearest supply of water. Even such facilities are not necessary to the sustenance of a population in deserts of the most extreme type, as illustrated by the Sahara, which has a population of two and a half million people. So far as the vegetation is concerned, the actual number of individuals is much less than on a similar area in a moist climate. This, in fact, is one of the chief characteristics of a desert, but it would not be safe to estimate the total number of species much below the average number. Lastly, be it remembered that local topography has but little influence on the desert character of a region. Sandy flats, plains, valleys, and rocky hills reaching to such altitudes as to become mountains are included in some desert tracts. It follows as a natural consequence of the sparse vegetation as one factor that the surface layers of the substratum, being usually dry in arid regions, are readily shifted and worn by winds.

THE CAUSES OF A DESERT

The term desert may be applied to areas of the earth's surface which support a sparse vegetation of a more or less specialized character, owing to inadequate rainfall or to the unsuitable composition or lack of soil. Of these conditions, scanty water supply may be regarded as of the greatest importance, and it is to this factor that most deserts owe their existence. Desert conditions arise in any region in which the rainfall is markedly less than the amount of water that evaporates from the surface of this liquid in the open air. As the amount of evaporation naturally increases from the polar regions toward the tropics and is affected by winds and elevation, it follows that no arbitrary amount of rainfall may be designated as an invariable cause or accompaniment of arid or desert conditions. Thus in certain portions of the tropics a rainfall of less than 70 inches results in aridity, while some of the most fertile agricultural districts in the north and south temperate zones receive scarcely one-third this amount.

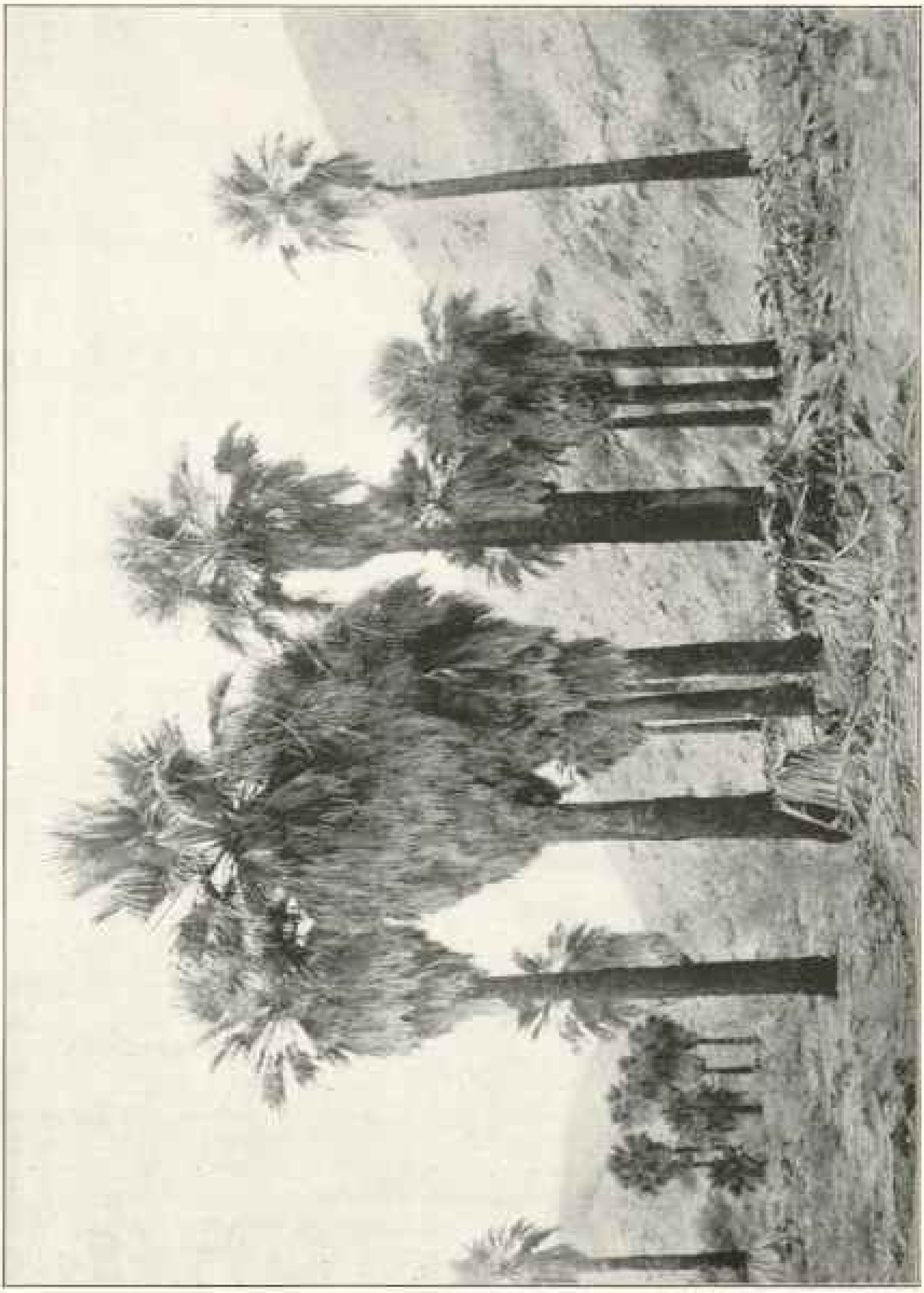
Regions in which precipitation is less than evaporation are characterized by a lack of running streams or of a permanent run-off, although in some instances these districts may be traversed by large rivers which have their sources in distant mountain ranges, as in the case of the Nile in Africa and of the Colorado River in America. The rainfall in a desert may be so heavy at certain seasons as to produce torrents of great volume, which, rushing downward over the slopes and mountain sides, wear distinct streamways extending out into the plains below, in some instances for miles; but the flow soon ceases after the rains have passed, and the stream beds become dusty channels until the next rainy season. Striking examples of such streamways are to be seen in the great Sonoran desert in northwestern Mexico. It is evident that districts in which the average rainfall is not much greater than the evaporation are in a very critical condition, since in seasons of minimum precipitation the amount of water received may be less than that lost, and drouth may result, often with direful effects on agricultural operations and economic conditions in general.

The seasonal distribution of the rainfall is a matter of importance in regions where evaporation is nearly as great as precipitation. If the rainfall occurs within a brief period, the remainder of the year must be extremely dry, and the region will show distinct desert conditions, with a tendency on the part of the native plants to develop marked storage capacity for water. The distribution of the scanty rainfall throughout the year in any region will favor the development of slowly growing xerophytic forms.

Arid deserts occur in all of the great land divisions and reach an enormous extent in Africa, Asia, and Australia. The most pronounced desert conditions of South America are found on the western slopes and benches of the Andes. One locality, that of Copiapo, has an average precipitation of 0.4 inch per year, and, so far as known, is the driest spot on the earth's surface. The deserts of North America are confined to the Cordilleran region and occupy plateaus and plains east and west of the main ranges to an extent of more than a million square miles.

THE AMERICAN DESERTS

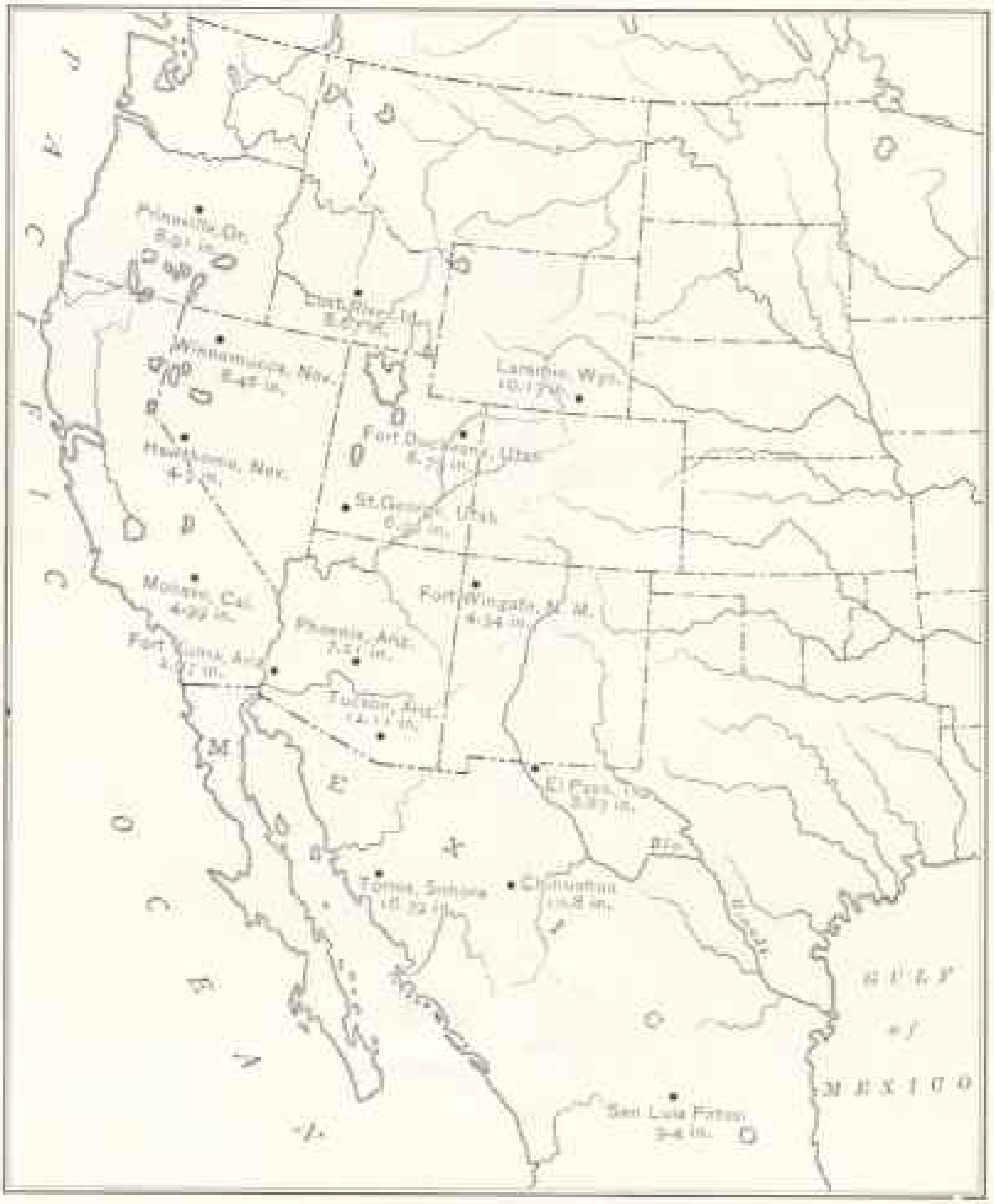
A study of the physiographic, floristic, and meteorological features of western North America has resulted in delimiting two great desert areas by the geographer, botanist, and meteorologist. The outlines of these might be roughly



From Coville and MacDougal, Carnegie Institution

Group of Palms in the Colorado Desert, California

Old discarded leaves are lying under the trees



Location of and Annual Precipitation at Certain Stations in the Arid Region of Western America. Chiefly from Records of the U. S. Weather Bureau

traced by lines connecting the stations shown in the accompanying map. These regions may be designated as the Sonora-Nevada Desert and the Chihuahua Desert.

The Sonora-Nevada Desert embraces portions of Utah, Idaho, Washington, Oregon, Nevada, California, Arizona, Baja California, Sonora, and Sinaloa. The northern portion of this region is mainly comprised in the Great Basin, and embraces the beds of a number of ancient lakes and the surviving Great Salt Lake. Other special physiographic features of interest in this connection are the areas which bear the names of Snake River Desert of Idaho, the Sage Plains of Washington, the Lava Beds of

Oregon, the Ralston Desert in Nevada, Death Valley, Mohave Desert, Colorado Desert, Salton Desert, in southern California and Arizona; the Painted Desert in Arizona and New Mexico, and the Sonora Desert in Mexico. The southern portion of the region consists of a series of extended slopes and terraces traversed by many ranges of hills and mountains with peaks of some altitude. Along the shores of the Gulf of California and of the Pacific Ocean proper, the desert area includes the entire surface to within a few feet of the water's edge, and the xerophytic vegetation of the plains comes into direct contact with the mangrove and strand flora.

The Chihuahua Desert occupies the central tableland of Mexico east of the Sierra Madre, extending as far south as San Luis Potosi, and including parts of the states of Coahuila, Chihuahua, and Texas, and also portions of Arizona and New Mexico. The Bad Lands of the Dakotas and Montana and the Red Desert of Wyoming might be regarded as a northern arm of this region for the purposes of this paper. The arid portions of this area consist, for the most part, of great valleys inclosed by parallel ranges of mountains, which in some instances attain such altitudes as to be timber-clad and even bear an alpine vegetation.

One of the striking features of the Chihuahua Desert consists of the great sand dunes, or "medanos," more than a hundred feet high, in some instances forming great ridges that have almost the imposing appearance of mountain ranges; these move across the floor of the desert plains with a sweep that obliterates minor features of topography. These moving dunes bear a characteristic vegetation adapted to the unusual physical conditions offered by the sand and lack of water and nutrient material. The gypsum deposits forming the White Sands in the Tularosa Desert north of the Rio Grande possess unusual chemical properties. The Jornada del Muerto (Journey of Death) of the ancient Spanish explorers lies in the western portion of the Chihuahua Desert in New Mexico separated from the Tularosa Desert by the Organ Mountains. Farther northward the great stretches of *malpais*, or black volcanic rock, form a desert district of the extreme type, while numerous areas are impregnated with alkali, and are either almost wholly free from vegetation or support only halophytic species. The Bad Lands of Dakota owe their desert character to the peculiar composition of the soil, which is clayey, poor in nutrient substances, and subject to great erosion, so that extensive areas are destitute of vegetation of any kind.

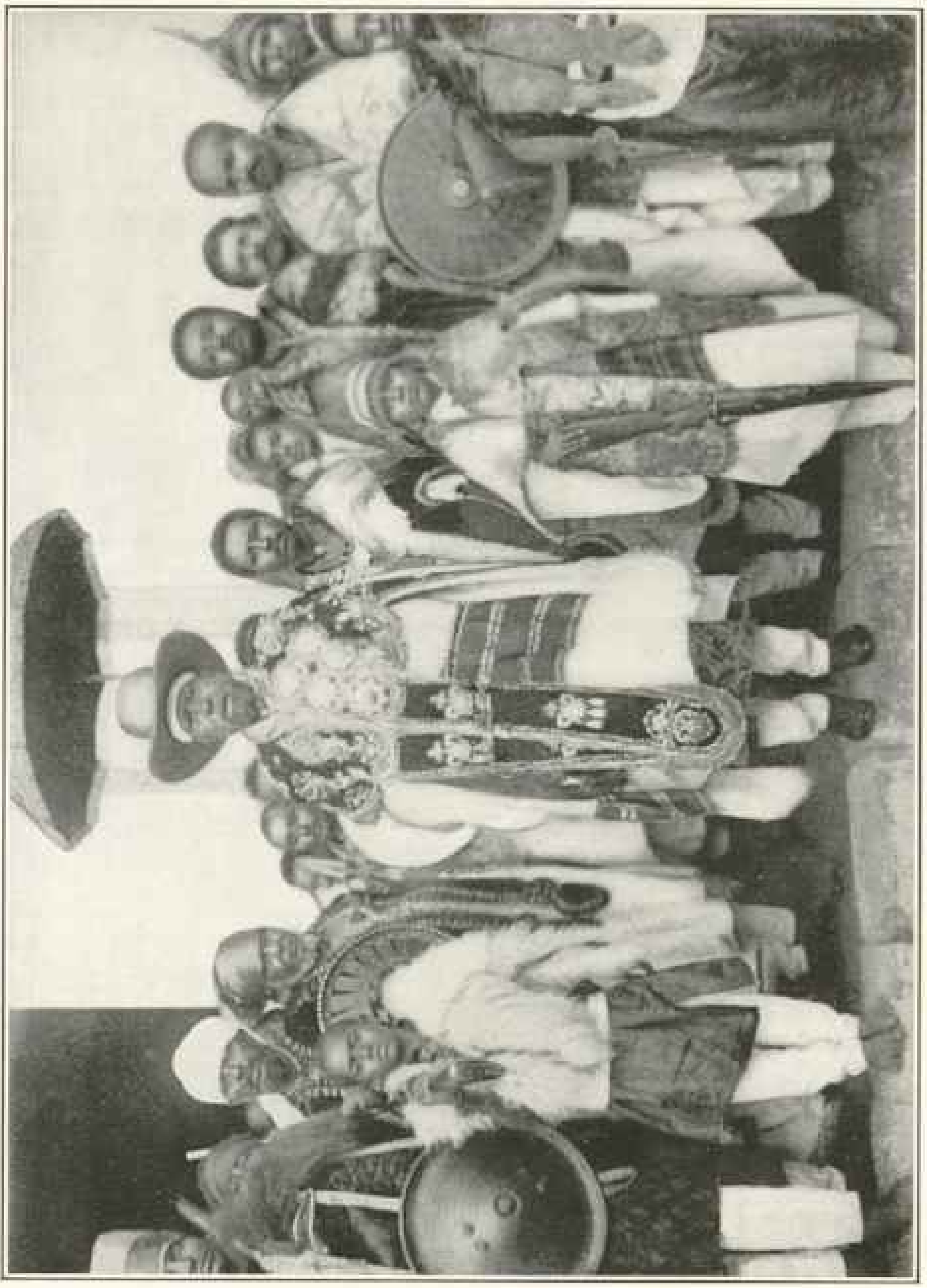
THE INTENSITY OF DESERTS

The most interesting feature of the report is a table showing the intensity of the deserts—the ratio of rainfall to evaporation—in the arid regions in the United States.

From this table it appears that Fort Yuma is the driest spot in the country, its rate of evaporation being 35.2 times greater than its normal rainfall.

Place.	Annual precipitation				Annual evaporation (estimated).	Ratio.
	No. of years.	Max.	Min.	Mean.		
		In.	*In.*	*In.*	*In.*	
El Paso	24	18.30	2.22	9.22	80	8.7
San Luis Potosi	1			16.41		
Chihuahua	1			10.96		
Fort Wingate	39	25.00	6.57	14.00	80	5.7
Fort Yuma	56	5.86	0.60	2.84	100	35.2
Phoenix	18	12.83	3.77	7.06	90	12.7
Tucson	29	18.37	5.26	11.74*	90	7.7
Mohave	26	21.38	2.20	4.07	65	16.1
Hawthorne	12	8.35	1.89	4.50	80	17.8
Winnemucca	22	11.91	4.89	8.31	80	9.6
St. George	13	9.84	3.53	6.46†	90	13.9
Fort Duchesne	25	11.43	4.36	6.49	75	11.6
Prineville	6	11.64	7.49	9.01	70	7.8
Lost River	7	11.86	6.22	8.47	70	8.3
Laramie	13	14.42	5.56	9.81	70	7.1
Torres	2			16.79	100	6.0

* From 11 years' observations.
† From 22 years' observations.



Menelik, King of Ethiopia, Awaiting the Arrival of U. S. Commissioner Skinner, in the Aderach or Imperial Parlor

CONSUL SKINNER'S MISSION TO ABYSSINIA

ROBERT P. SKINNER, U. S. consul-general at Marseilles, who was sent on a special mission to Abyssinia, in November of last year, to negotiate a trade treaty with King Menelik and to gather information respecting the commercial resources of that country, has made a brief report of his mission to the Department of State. As a result of Mr Skinner's efforts a treaty has been negotiated with the Emperor's government which, if ratified by the Senate, will secure to the United States for all time the privileges of the most favored nation in Ethiopia, and at the same time guarantee to our citizens and to our merchandise immunity from discrimination in rates upon all public roads and lines of communication. The following paragraphs are extracted from Mr Skinner's report:

Acting on behalf of the Agricultural Department, I have secured a collection of the seeds of the more important crops peculiar to Ethiopia, a number of which may be found valuable in the exploitation of the uncultivated western lands of the United States. A collection of wild coffee seeds for experimental purposes could not be obtained during my visit, but have been ordered and will be ultimately forwarded. Such a collection could only be found in Kaffa, a remote province of the country, access to which involves a long and expensive journey. The experts of the Agricultural Department have a theory that the degeneration of the modern plantations is due to the fact that coffee culture has been based upon seed originally imported from Arabia, and that by getting back to the wild coffee plant, the habitat of which is the province of Kaffa, a new variety may be created, the value of which will be incalculable. My endeavor to obtain a pair of large zebras for cross-breeding purposes was also in vain. These animals are exceedingly rare and difficult to capture alive. I have left instructions, however, in regard to this matter, and trust to be able to supply two of these animals sometime in the future.

The journey from Djibouti to Dire-Douah was made over the barely completed railroad, a distance of 186 miles. At this point camels were procured for the baggage and supplies, and mules for mounts. Our party of thirty succeeded in departing from Dire-Douah on November 28 for the capital, where we arrived December 18, camping about three miles from the Emperor's palace. Our arrival was the signal for prompt calls from M. Léon Chefneux, counselor of state, and one of the two foreign advisers of the Emperor, M. Alfred Ilg being then absent in Europe. Two hours later, accompanied by M. Chefneux, the mission set out for the aderach, or seat of government, accompanied by an Ethiopian escort of 3,000 men under the command of a distinguished general.

Although our reception at Harrar had not been devoid of military pomp, we were all astonished and our appreciation of the picturesque gratified by this first glimpse of Ethiopian troops upon a ceremonial occasion. Arrayed in gorgeous silks and satins, with lion and leopard skin mantles, gold and silver plated bucklers, carrying lances from which floated the national colors, mounted upon spirited horses, they galloped into formation, the very order of which was an apparent disorder, shifting like a kaleidoscope and constituting a scene as indescribable as it was memorable. A band of shawm-players heralded our coming with weird music which has not changed since the fall of Jericho.

At the palace, or guebi, our escort fell back, and the mission, always accompanied by the marines and blue jackets, proceeded through a series of court-yards, and after receiving a salute from a company of 200 native artillerymen under the command of a European officer, and a further salute of 21 guns in honor of the United States, we entered the aderach, an audience chamber of cathedral-like proportions and form. The Emperor sat upon his throne, surrounded by his more important advisers, representing the administrative departments, the judiciary, the army, and the church, and back of the two rows of pillars supporting the roof were massed several thousands of the leading people of Addis-Ababa, all in holiday regalia. Our reception was cordial, but formal. Within half an hour the members of the mission accompanied by the escort of Ethiopian troops, which had waited outside, and augmented by the Emperor's private band, playing European instruments, and by native troops uniformed and marching in European fashion, left the palace for a compound assigned to us.

Nine days were spent in Addis-Ababa with daily conferences over the treaty with the Emperor or his foreign advisers. A farewell audience was arranged and took place on the afternoon of December 27, immediately prior to which the Emperor sent to me two young lions and a pair of elephant tusks, together with a personal letter addressed to the President, requesting me to deliver these testimonials of his friendship and good will upon my return to the United States. In further manifestation of his satisfaction, at the conclusion of this final audience, he tendered decorations to all the officers of the mission and presented medals to the marines and soldiers.

Probably for the first time in the modern history of Ethiopia has a foreign mission visited the country upon an errand of peace and amity, bringing no vexed question of territorial integrity or national honor to decide, and neither asking nor granting anything to which both sides could not accede.

Ethiopia being without a seaport and hemmed in by three European powers, each one striving to supplant our merchandise, we came none too soon to protect our trade by the negotiation of a treaty which should guarantee equal treatment to our merchandise, not only in respect to import duties, but, more important still, in respect to equal rates of transport.

Ethiopia is wealthy in resources beyond the power of any man to calculate. Gold, silver, asphalt, petroleum, iron, and coal exist in combination with a salubrious climate, agricultural productiveness, and a population of singular docility. With watchful eyes upon the future, the Emperor seeks to preserve the political independence of his people, which has been handed down through the centuries, and in the meantime he hopes to develop the intelligence and resources of the population of 10,000,000 to such a point as to enable it to withstand any pressure from without.

The Development of Nevada. No state in the Union has so long and so badly needed an increase of population as has Nevada. Her population of 42,000 today is less than it was in 1870, six years after her admission as a state. It is gratifying to know, therefore, that she will more than double her present numbers when the vast government irrigation works begun on the Truckee and Carson Rivers are completed. It is estimated that the works will make productive about 375,000 acres of sage brush desert in the western part of the state. These lands will furnish fertile homesteads of about 80 acres each for 4,500 families. Towns and villages will naturally spring up, so that Nevada may expect from the reclamation an increase of 60,000 at the least.

THE SAILING SHIP AND THE PANAMA CANAL

BY JAMES PAGE, U. S. HYDROGRAPHIC OFFICE

IN the minds of a majority of those whose lives have been spent in the interior, and to a certain though less widespread extent among those whose daily vocation has brought them in touch with the sea, the opinion is current, always expressed in a tone of regret, that the value of the wind as a motive power in transportation by water is no longer worthy of study, and that the sailing ship as a factor in commerce is shortly to take its place on the shelves of the museum of antiquities beside the Roman trireme. No such apprehension need exist. Of the net tonnage of the world quoted in Lloyd's summary for the year 1903-'04, amounting to 23,282,000 tons all told, 6,466,000 tons, or in the neighborhood of 28 per cent, is still credited to sailing vessels, the number of bottoms being 17,761 and 12,182, steam and sail respectively.

THE UNITED STATES SECOND IN SAILING TONNAGE

With regard to flag, the United States, the most progressive among nations in the application of machinery, strange to say, stands high in the list in the relative proportion of sail to steam. For this country the figures given are 1,390,000 tons sail and 1,566,000 tons steam, respectively, America, in the absolute amount of sailing tonnage, standing far in advance of all other nations, with the single exception of Great Britain, and in the relative amount, as compared with steam, in advance of all save two, Italy and Norway, in both of which latter the total amount of sailing tonnage still exceeds that of steam.

An explanation of the erroneous impression which exists as to the importance of sailing tonnage may be found in the fact that it is in a majority of cases derived from a casual inspection of the merchant fleets in the northern harbors of the Atlantic seaboard—Boston, New York, Philadelphia, and Baltimore—ports in which the passenger and express traffic exercises a preponderating influence. Here, indeed, the eye will often seek, and seek in vain, amid the series of smoke-begrimed funnels and uncouth hulls which line the docks, for the taut rigging, the trim spars, and the graceful lines of the clipper ship. In the more southerly Atlantic ports and along the Pacific coast the sailer is a more frequent visitor. In the fiscal year 1901-'02, according to the report of the Bureau of Statistics upon the foreign trade of the United States, the total number of vessels entering the port of New York from abroad was 4,127, with a total tonnage of 8,893,000. Of this number, 974, embracing 484,000 tons, were sailing vessels—*i. e.*, 24 per cent of the whole number of entries, carrying but 5 per cent of the whole tonnage. In the port of Pensacola, on the other hand, one of the most active in the Gulf district, the aggregate number of entries was 344, the total tonnage amounting to 428,000. Of this number, 180 were sailing vessels, carrying 140,000 tons—*i. e.*, 52 per cent of the total number of vessels, carrying 33 per cent of the total tonnage.

On the Pacific coast the same general features obtain, although here the contrast between express and freight ports is by no means so marked. The returns for the same year show for the port of San Francisco 580 entries, with a total tonnage of 1,016,000. Of this 269 were sailing vessels, with a capacity of 436,000 tons, the number of sailing entries thus amounting to 47 per cent of the whole, carrying 43 per cent of the total tonnage. Going north to Portland, however, where the freight traffic (lumber and grain) alone is important, the number of entries is 129, with a total tonnage of 236,000, distributed between 25 steamers and 104 sailing ships, the tonnage of these latter amounting to 177,000, or 75 per cent of the whole.

For the several seaboard districts of the United States the figures for the fiscal year 1901–'02 in their entirety are as follows :

	No. of entries.	Per cent.	Tonnage.	Per cent.
Atlantic :				
Total	11,187	100	17,145,000	100
Steam	7,206	64	15,822,000	92
Sail	3,981	36	1,323,000	8
Gulf :				
Total	3,478	100	1,956,000	100
Steam	2,320	67	1,689,000	86
Sail	1,158	33	267,000	14
Pacific :				
Total	3,764	100	3,261,000	100
Steam	2,809	75	2,205,000	68
Sail	955	25	1,056,000	32

THE PACIFIC THE CRUISING GROUND OF THE MODERN SAILER.

A fact worthy of note is established by a comparison of the figures here given for the Atlantic and the Pacific coasts. On the former the total freight landed in the country from foreign ports by sail amounted to 1,323,000 tons, the number of cargoes being 3,981. The average cargo was thus in the neighborhood of 350 tons. On the Pacific coast the freight brought by sail amounted to 1,056,000 tons, the cargoes, however, numbering but 955, or on the average about 1,100 tons. In other words, the average tonnage of the sailing vessel on the Atlantic is but one-third of that on the Pacific. The fact is significant as going to show that the latter ocean is at present, and is likely to remain for many years to come, the cruising ground of the modern sailing ship, the growth of which during the last two or three decades has been considerable, although not so startling as that of her younger but gigantic sister, the modern steamer.

FAMOUS AMERICAN CLIPPERS.

The American clippers which astonished the world by their wonderful performances in the 50's—the *Flying Cloud*, which made the voyage from New York to San Francisco in 84 days; the *Northern Light*, which made the return voyage in 77 days ; the *Sovereign of the Seas*, which left New York Saturday, June 18, and anchored in the harbor of Liverpool July 1, 1852, having sailed across the Atlantic in less than 14 days—were not large vessels, as measured by present-day standards, the first two being less than 2,000 tons burthen, the last less than 2,500 tons. Even as late as 1880 the list of merchant shipping of the United States mentions but 19 sailing vessels of a tonnage greater than 2,000, while at the present time sailing ships of 3,000 tons and upward are not exceptional, the limit for the time being having been reached for fore-and-aft rig in the seven-masted steel schooner, *Thomas W. Lawton*, 5,008 tons, built at Quincy, Mass., and for square rig in the five-masted steel bark *Preussen*, 5,081 tons, built in 1902 for the Laeisz shipping agency of Hamburg.

The achievements of this vessel, the largest of her class, in the matter of speed, as also those of her sister ship, the *Potosi*, have excited much interest, not only as evincing superior construction and masterly handling, but also in view of the support they lend to the belief that the sailing ship has not yet attained those dimensions attended by maximum speed. The most remarkable performance of the *Preussen* thus far has been the completion of the voyage from the Channel to Iquique, Chile, a distance of 12,000 miles, in 57 days—about the time made by the steam freighters engaged in the South

American trade. On this voyage the vessel took her departure from Ouessant March 5, 1903, and crossed the line March 18, thirteen days out, establishing a record never before equaled by a sailing ship. The parallel of 50° S. in the Atlantic was attained April 10, and in the Pacific April 21, eleven days being thus spent in weathering that most tempestuous of regions, Cape Horn. From noon of April 23 to noon of April 24 the vessel laid down 368 miles to her credit, this being the best day's run throughout the voyage. The anchor was dropped in the harbor of Iquique May 1, fifty-seven days from point of departure to destination.

Prime among the factors which are to exercise an influence over the relative use of sail and steam in navigation is the question of the cost of fuel, and the proportion of the steamer's carrying capacity, which must be devoted to its transportation. Given ports of departure and destination not too remote from each other, and coal cheap at both ends of the line, the sailing ship has but little chance of survival. In longer voyages, say those of 6,000 miles and upward, the space which must be allotted to fuel in the case of the steamer becomes considerable, and may cut down the cargo-carrying capacity to such a degree as to seriously interfere with the profits of the voyage. Coaling stations remedy this evil to some extent; but at these coal is always expensive, rising at some points to as much as $15 per ton, while their frequent use, furthermore, is liable to unduly protract the voyage in point of both distance and time. In the event of the successful application of low-grade petroleum for use as fuel at sea, many of these difficulties will of course disappear.

TIME SAVED BY A KNOWLEDGE OF THE METEOROLOGY OF THE SEA.

A factor by no means generally recognized, but of vast importance to profitable navigation by sail, is the better knowledge which we are gradually acquiring of the meteorology and physical geography of the sea. The era of record passages is closed, and sailing ships are no longer urged to their utmost speed in the hope of outstripping a rival, even at the sacrifice of cost and safety. As a consequence, the study of the winds and currents of the sea has not the vital interest which it possessed in the days of Maury, when the relative performance of the *Sea Witch*, the *Dreadnought*, the *Invincible*, the *Oriental*, and other like fancifully named craft was a matter of international discussion. The investigation has, however, gone earnestly forward, and the sailing ship has reaped the benefit in the shape of greater security, quicker passages, and larger profits. First among the national institutions interested in this work is the Deutsche Seewarte, having its central office in Hamburg, Germany, and a single instance will serve to show the practical value of the results which have been accomplished in this direction. The exportation of saltpeter from the nitrate ports along the west coast of South America to Europe is handled exclusively by German sailing ships, and the best sailing route from the English Channel to the coast of Chile and return has since the inception of this trade been made the subject of special investigation by the Seewarte. As a result of this study the time of passage has steadily diminished. During the early 70's, the epoch at which the trade first became active, the voyage from the Lizard to Valparaiso occupied over 100 days. Careful discussion of the material meanwhile accumulated, leading not so much to change in the route as to more intelligent handling of the vessel by the shipmaster under given meteorological conditions, has succeeded in reducing this time materially, the successive steps of the improvement being as follows:

1876–1880, 18 passages; average time, 102 days.

1881–1884, 38 passages; average time, 91 days.

1885–1888, 64 passages; average time, 88 days.

1889–1892, 83 passages; average time, 83 days.

With this much said in support of the claim that navigation by sail is still a factor in freight transportation, fulfilling in the case of a long voyage a sphere for which the steamer is ill-adapted; that it even has a future of increased usefulness before it, and that its interests must be considered in any broad scheme whose aim is the promotion of the world's commerce, the question of the value of the proposed interoceanic canal from the point of view of the sailing ship is worthy of consideration.

Although not so unfortunately situated in this respect as the Suez Canal, where the Red Sea, with its strong monsoon winds, numerous shoals, and intricate passages, interposes an insuperable obstacle to navigation by sail, the neighborhood of the proposed American canal is by no means free from difficulty. The whole isthmus from Tehuantepec eastward to Colombia lies within the tropics, and the climate exhibits the characteristic tropical feature to a marked degree. The year is divided into two seasons, the wet and the dry, the former lasting from May to December, the latter from January to April. In the vicinity of Colon (latitude 9° 22′ N., longitude 79° 55′ W.), the Atlantic terminal of the canal, and of Panama (latitude 8° 52′ N., longitude 79° 31′ W.), the Pacific terminal, the average annual rainfall amounts to 125 inches and to 47 inches respectively, distributed throughout the several months as follows:

	Colon.	Panama.
January	1.9 inches.	0.5 inches.
February	1.5 "	0.0 "
March	1.3 "	0.2 "
April	2.7 inches.	0.9 inches.
May	11.6 "	5.3 "
June	13.9 "	5.2 "
July	14.3 "	4.5 "
August	14.9 "	5.7 "
September	12.6 "	7.3 "
October	13.8 "	6.9 "
November	23.6 "	5.6 "
December	12.2 "	4.8 "
	124.3 "	46.9 "

At both places the average monthly temperature is 79° Fahrenheit, the variation from month to month being insignificant. The extreme temperatures are 68° and 95° Fahrenheit. The relative humidity is of course excessive, ranging from 90 per cent during the early forenoon hours to 75 per cent during the afternoon.

THE WINDS OF THE ATLANTIC END OF THE CANAL.

With regard to that feature of the weather most essential to navigation by sail, viz, the winds, the northeast trades blow home to the Caribbean coast throughout practically the entire year. They attain their greatest force and their most northerly direction during the dry season (January–April), and it is during these months that along the eastern coast of Central America the dreaded "northers" occur—storms which give so little warning of their approach and blow with such dangerous violence that steamers calling at Colon are invariably required to keep up steam in order that they may be able to slip their cables and put to sea at a moment's notice. As the wet season advances the trades weaken in force, at the same time inclining to southeast; and at its height, during August and September, brief periods of southwesterly winds occur, these, however, being no longer the northeast trades of the Atlantic, but the prolongation of the southeast trades of the Pacific, which, reaching across the equator into northern latitudes, are converted by the earth's rotation into southwesterly winds and at intervals attain sufficient force to traverse the isthmus.

A sailing vessel approaching the coast from the eastward will thus experience but little difficulty on the score of wind. Once within the chain of islands enclosing the Caribbean Sea, a straight course may in general be shaped for the entrance to the canal, and the trades, although light in force during a large portion of the year, will serve to bear her to the desired haven. Currents also will assist, for throughout the entire sea, except in the immediate neighborhood of the coast of Cuba on the north, and of Venezuela and Colombia on the south, the motion of the surface water is to the westward.

The log of a sailing vessel emerging from the eastern terminus of the canal into the Caribbean will tell a different story, the conditions which facilitated to such a degree the approach toward the port of Colon serving in like measure to embarrass departure from it. To steer a direct course in the face of the trades will be impossible, and no matter what her ultimate destination, the square rigger will find it necessary to seek an outlet from the Caribbean Sea by way of the Yucatan Channel, and thence through the straits of Florida into the Atlantic.

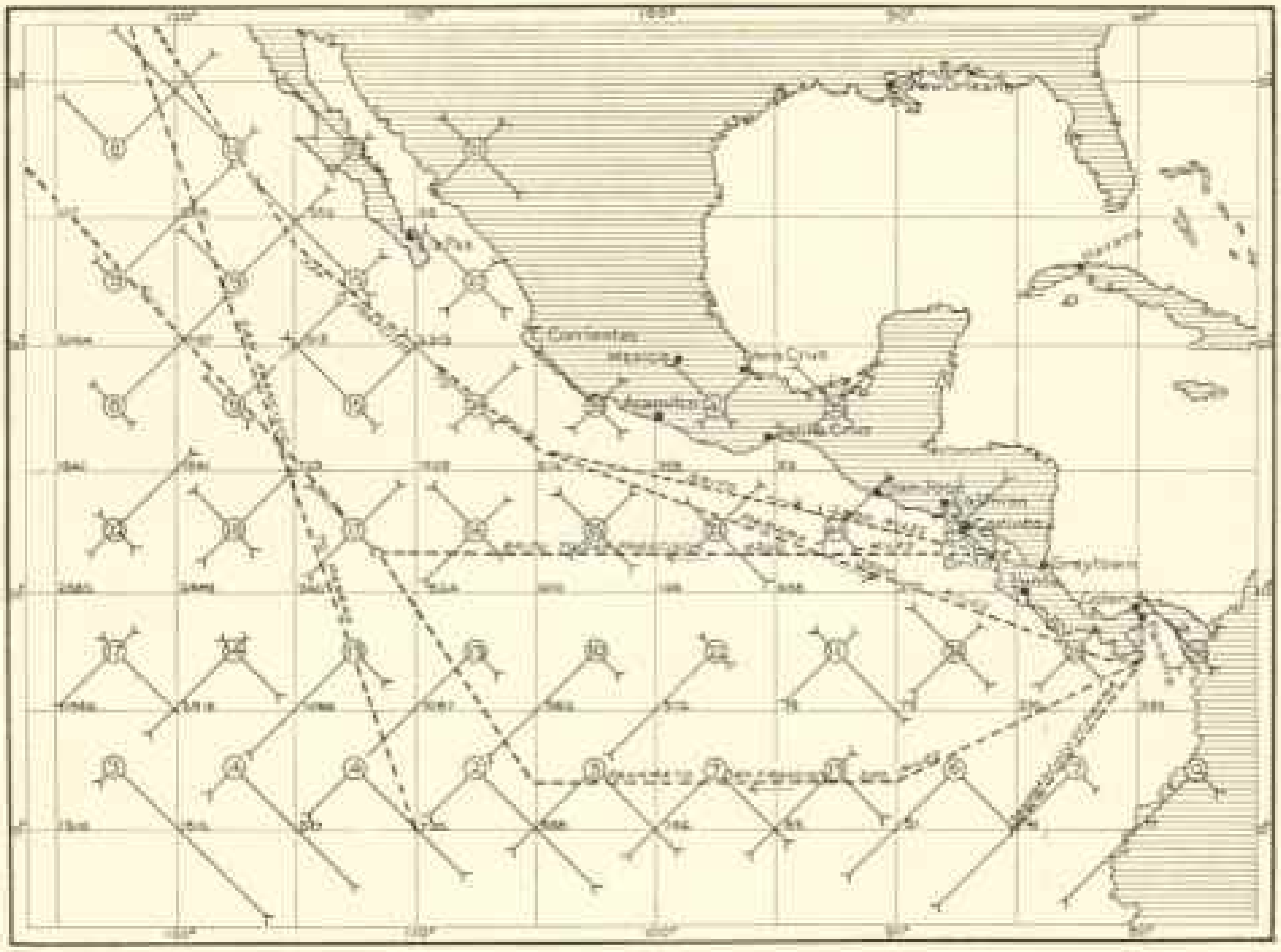
In the case of vessels bound to a European or an American port such a route will not involve any very great sacrifice of distance. For those destined to points below the equator—for example, the fleet engaged in the lumber trade from Puget Sound to South Africa, one of the most important lines of traffic still monopolized by the sailing vessel—the detour, necessitating as it does the attainment of the parallel of 35 degrees in the North Atlantic in order to circumnavigate the northeast trades, will be out of the question, and these will continue to make the passage by way of Cape Horn.

As to the feasibility of the route from Colon to the straits of Florida, it may be stated that during the wet season the passage will offer but little difficulty, the trades at this time being light in force and blowing from a point well to the eastward, or even south of east. During the dry season, however, different and decidedly adverse conditions prevail. From November to April the trades along the coast are northerly or even northwesterly in direction, and frequently attain the force of a fresh gale, requiring a close-hauled ship to reduce her canvas to reefed topsails and courses. Under these circumstances the voyage resolves itself into a steady beat to windward under most trying circumstances.

Owing to the fact that the sailing traffic of the region is at present confined to fore-and-aft schooners, it is impossible to state with accuracy the delay which a vessel of large tonnage making the passage from Colon to Cape San Antonio during the winter months would thus suffer. An analogous situation exists, however, in the case of the passage up the China Sea at the time of the northeast monsoon, and the reluctance with which this latter feat is attempted by sailing masters may be gathered from the fact that during the prevalence of this monsoon the bulk of east Asiatic trade from Europe and America follows the sailing route leading to the southward and eastward of Australia, the majority of captains claiming that such a circuit results in a saving of time over the China Sea route, although it involves the running down of at least 3,000 miles additional distance.

BELT OF CALMS AT THE PACIFIC END OF THE CANAL.

At the eastern extremity of the canal the difficulties which a sailing vessel may expect to encounter will thus arise from a superabundance of wind rather than a lack of it. At the western extremity, on the other hand, these conditions will be completely reversed.

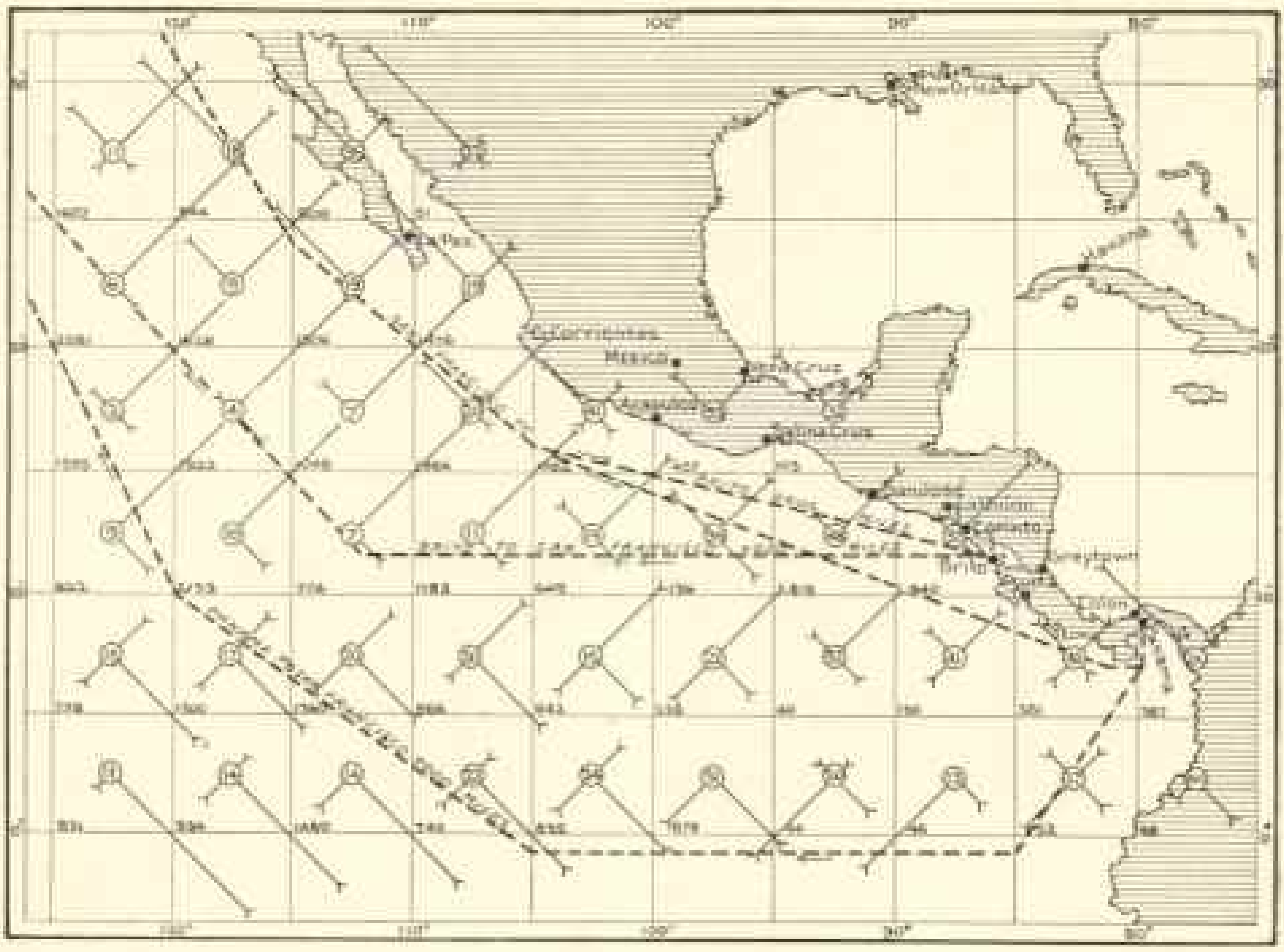


Winds, Calms, and Sailing Routes, May–October

Upon emerging from the canal into the Pacific Ocean a vessel will enter an extensive belt of calms and light airs, which render navigation by sail more tedious than in any other frequented portion of the sea.

In order to understand the feebleness of the winds throughout this region, a word is necessary as to the agency by which winds are produced. Wind is air in motion, the direction of the motion being always from an area throughout which the atmospheric pressure is high toward an area throughout which it is low, the strength of the wind at any point being within certain limits proportional to the barometric gradient or slope at that point. Where these gradients are steep the winds are strong; where they are gentle the winds are light; where they are absent, or, in other words, where the barometric pressure is uniform, the force giving rise to the winds vanishes and the air is accordingly at rest.

It is such a uniformity of pressure that exists throughout the region under consideration. Under normal conditions the distribution of atmospheric pressure over the earth's surface consists of two extratropical belts of high pressure, separated by an equatorial belt of low pressure, each of these three belts completely encircling the globe. On the equatorial slope of the high-pressure belts there is a steady movement of the air toward the low-pressure trough which separates them, this movement constituting in the northern hemisphere the northeast trades, in the southern hemisphere the southeast trades respectively. Between these two, coinciding



Winds, Calms, and Sailing Routes, November–April

roughly with the bottom of the trough which separates the high-pressure belts, lies a region known among seamen as the "Doldrums," characterized by moist, cloudy weather, absence of wind, and abundance of rain. The width of this region varies—at some points wide, at others narrow. In that portion of the North Pacific included between the American coast and the meridian of 120° W. it reaches a maximum, extending in latitude from a point one or two degrees north of the equator to Cape San Lucas, the southern extremity of Lower California. Throughout this whole region the barometric pressure is below the average and extremely uniform, ranging from 29.85 inches during the northern summer to 29.95 inches during the northern winter. Here, accordingly, barometric gradients are absent, the winds sink to stagnation, and calms prevail.

A knowledge of the general character of the winds of this region may be gathered from the following diagrams, the first holding for the northern summer, (May–October) and the second for the northern winter. The figures in the center of each five-degree square show the percentage of the time (number of hours in each hundred) during which calms or light variable airs may be expected to prevail, the length of the arrow in each quadrant, the percentage of the whole time during which the wind may be expected to blow from some point in that quadrant. The figures in the lower left hand corner give for each square the total number of observations considered. No attempt is made to show the average force of the wind, but it may in general be stated that for the entire area it does not exceed 3 on the Beaufort scale, corresponding to a velocity of 15 miles per hour, and capable of imparting to a full-rigged ship sailing "full and by" a speed of from 3 to 4 knots.

THE MEXICAN BELT OF CALMS.

From an inspection of these diagrams it is evident that the "Mexican Belt of Calms," as it is known among seamen, is triangular in shape, the base of the triangle resting on the American coast, and extending from the Gulf of California to the Gulf of Panama, the vertex of the triangle lying far out in the Pacific, its longitude roughly coinciding with the meridian 125° W., near the fairway of vessels bound from San Francisco to the line. In latitude, the position of the vertex, as well as the axis of the belt, or line along which the maximum frequency of calms occurs, changes slightly with the season. From November to April its mean position is between 5° and 10° N. As the summer advances and the sun moves northward, however, the axis of the belt likewise recedes from the equator, its average position for the months May–October lying between 10°–15° north. The frequency of calms increases rapidly as the coast is approached. Immediately under the coast, however, a diminution may in some instances be noted, due to the presence of the land and sea breezes, and also to the fact that at certain points the trade wind of the Caribbean seems to reach across the Isthmus.

A REMARKABLE CASE OF POCKETING.

A single example—an extreme case, however—will serve to illustrate the delay to which a vessel may be subjected in the endeavor to navigate this dead-center of the winds. The German bark *Arona* sailed from Punta Arenas, a point on the Isthmus somewhat to the west of Panama, December 3, 1890, bound for Hamburg. Upon leaving port light southwesterly winds were encountered, interrupted by frequent periods of calm, and with these the bark made the best of her way, on the starboard tack, to the southward. On December 10, her position at the time being latitude 6° N., longitude 84° W., the wind still holding from the southwest, the vessel went about on the opposite tack in the hope of obtaining better conditions to the westward. Thirty-two days later, or on January 11, 1891, the position was latitude 5° N., longitude 88° 40' W., the total distance made good during the 39 days since leaving port amounting to but 350 miles. The strong northeasterly current flowing in toward the Gulf of Panama set the vessel as far back each day as the light airs carried her forward, and it was not until January 27, 55 days out, that she finally succeeded in crossing the equator in longitude 96° west.

In both approaching and in leaving Panama, irrespective of the port from which or toward which bound, a sailing vessel must of necessity navigate a greater or less width of the belt of calms just described, and in estimating for a given voyage the saving of time effected by the use of the canal the delay arising from this cause must not be neglected.

THE OCEAN HIGHWAYS OF SAILING VESSELS

As organized at present, the sailing traffic of the world is confined to certain well-beaten highways, dictated in part by the physical agency of the winds and in part by the demands of trade. Taking the English Channel and the port of New York as points of departure, the most frequent destinations are, to the westward (by way of Cape Horn), the Pacific coast ports of South, Central, and North America, and, to the eastward (by way of the Cape of Good Hope), the ports of South Africa, Australia, and Eastern Asia. Outward-bound vessels in general carry a mixed cargo, the most important staple being case oil, which goes from New York and Philadelphia to China and Japan.

The westward-bound contingent return as they went, viz, by way of Cape Horn—those from South America laden with nitrates; those from Central America with dyewoods and ore; those from North America with lumber and grain. The eastern-bound contingent maintain their easterly progress, the large majority ultimately fetching up at one or another of the Pacific coast ports of the Union; those from Australia bringing to that coast a cargo of coal from Newcastle or Sydney; those from Hongkong, Shanghai, and Yokohama ordinarily proceeding in ballast after discharging at those ports. In Puget Sound, Portland, or San Francisco these likewise are chartered to transport lumber or grain to Europe and South Africa.

An inspection of the map will reveal the fact that the sailing highways likely to be most seriously affected by the construction of the Panama Canal, should the latter prove practicable for sailing vessels, are the present route between the Channel and the west coast of North America, outward and homeward, and the homeward route from the west coast of South America. Vessels outward-bound to the latter coast will in any event continue to round Cape Horn, inasmuch as the use of the canal by a vessel bound to a Chilean or a Peruvian port would involve upon emerging upon the Panama side a detour of several thousand miles in order to circumnavigate the southeast trades in the Pacific.

TIME SAVED FOR SAILING VESSELS BY THE PANAMA CANAL.

As to the saving of time likely to be effected by the substitution of the canal for the present route around the Horn, the figures are to some extent disappointing. The length of the voyage from the Channel to San Francisco by way of Cape Horn, following the sailing route laid down by the Deutsche Seewarte, is in the neighborhood of 16,000 miles. The average sailing time is 139 days. The return voyage, although 1,000 miles greater in distance, is made in less time, occupying but 132 days, the delay on the outward-bound passage being occasioned by the difficulty of beating around the Cape. As evidence of the importance of the traffic following this route, it may be stated that, during the year 1901–1902, 104 sailing vessels from the Channel entered at the Pacific coast ports of the United States alone, and 322 vessels cleared from these ports for the Channel.

The average sailing time from the Channel to Colon is 43 days, and from Panama to San Francisco 52 days. Allowing two days for passage through the canal, the duration of the voyage by the Isthmian route will thus amount to 97 days, as compared with 139 days by way of Cape Horn, or a net saving of 42 days. The substitution of any other Pacific coast port for San Francisco will serve only to increase or diminish the duration of both voyages to a like extent, the average sailing time to San Diego being three days less than to San Francisco, the average sailing time to Portland and Puget Sound respectively five days and seven days greater.

On the return voyage the saving in time is likely to prove considerably less. The average duration of the passage from San Francisco to Panama, as derived from the very few instances obtainable, is 55 days, while the voyage from Colon to the Channel, owing to the circuitous route which a sailing vessel is obliged to follow, occupies, under ordinary conditions, 60 days. Again adding the two days required to cross the Isthmus, the duration of the voyage from San Francisco to the Channel by way of the canal will thus prove to be 117 days, giving a saving of but

15 days as compared with the voyage by way of the Horn.

The coastwise trade between the Atlantic and the Pacific seaboard of the United States, so profitable prior to the construction of the transcontinental railways, has almost vanished from the sea, the traffic in coal alone surviving. Whether it can be revived by throwing the canal open to sailing vessels of small tonnage, coasting schooners, and the like, is a problem. The saving of time in this instance would be considerable, the duration of the voyage between New York and San Francisco by way of Cape Horn amounting to practically the same thing as the voyage from the Channel, viz, 140 days outward and 130 days homeward, while the passage from New York to Colon may be made in 20 days and the return in 28 days, giving for the total sailing time from New York to San Francisco *via* the canal 74 days, and for the return 85 days, which means a saving of 66 days and 45 days respectively.

THE NEW HOME OF THE NATIONAL GEOGRAPHIC SOCIETY

AT a meeting of the Board of Managers, March 5, Dr W J McGee, for many years past the active Vice-President of the Society, and the head of the Department of Anthropology and Archeology of the Louisiana Purchase Exposition, was unanimously elected President to succeed Dr Alexander Graham Bell, who resigned some months since in order to devote all his time to his experiments with kites. At the same meeting Mr G. K. Gilbert, Geologist of the U. S. Geological Survey, was unanimously elected Vice-President. Both Dr McGee and Mr Gilbert have been actively associated with the work of the Society since its organization in 1888. A portrait of Dr McGee was published in this Magazine in October, 1901, and of Mr Gilbert in July, 1900.

The new home of the National Geographic Society, Hubbard Memorial Hall, was formally opened on the evening of March 12. The event was observed by a reception to the members of the Society resident in Washington by Mrs Hubbard and her family, who have erected the building as a memorial to Hon. Gardiner Greene Hubbard, President of the Society from its organization until his death in December, 1897. On the first floor are offices for the Board of Managers, President, Treasurer, Secretary, and Editor. The second floor is a large room, to be used as a library, and also as a meeting place for the scientific meetings of the Society. In the basement there is a darkroom and rooms for the files of the Society. Several views of the building are shown on the succeeding pages. The cornerstone of the building was laid on April 26, 1902.*

It is hoped that all members of the National Geographic Society, when they come to Washington, will visit the home of the Society and make it as far as possible their headquarters while they are in the city.

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*See NATIONAL GEOGRAPHIC MAGAZINE, May, 1902, p. 174.

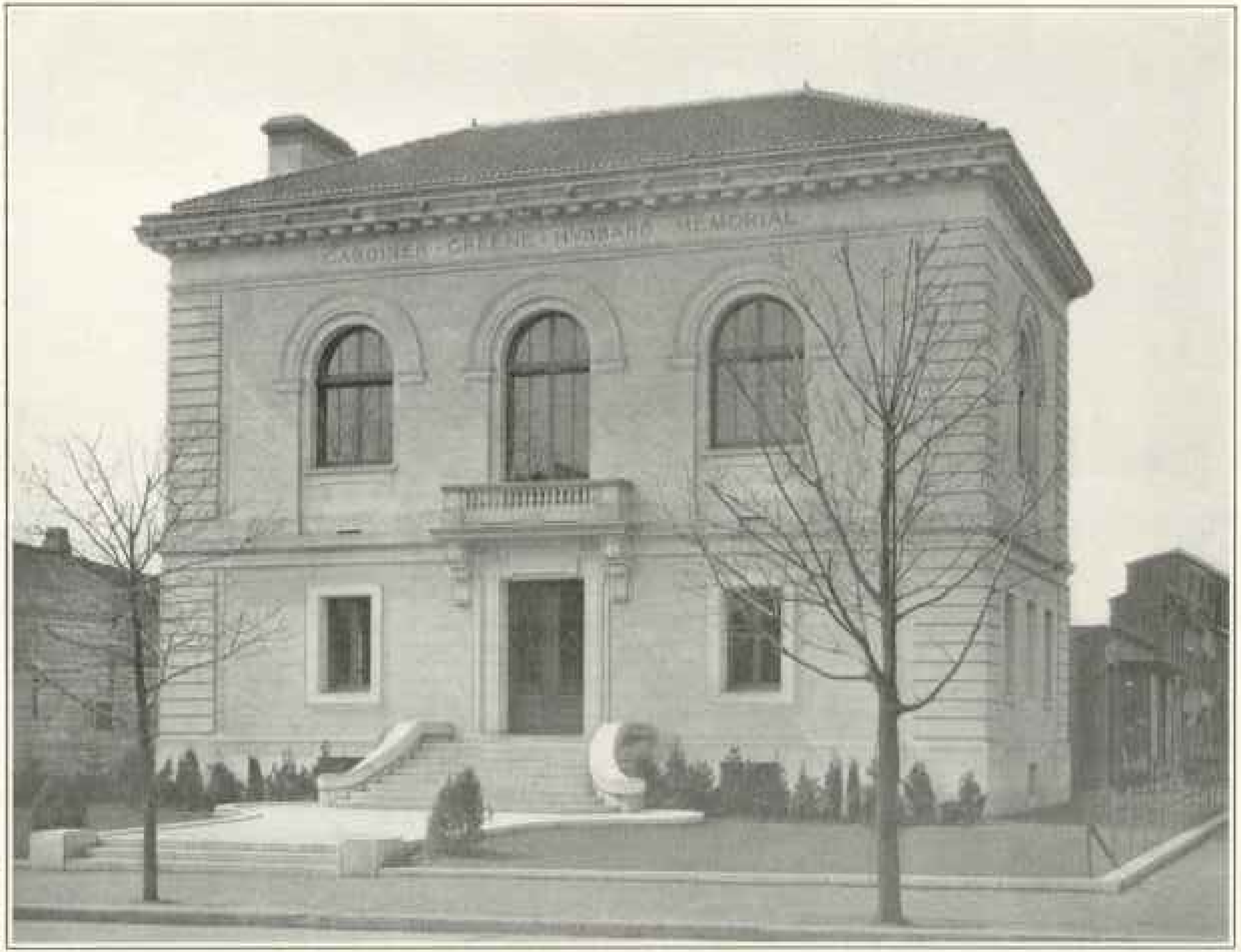


Photo by Leet Bros.

Hornblower & Marshall, Architects

The Gardiner Greene Hubbard Memorial Hall

The home of the National Geographic Society

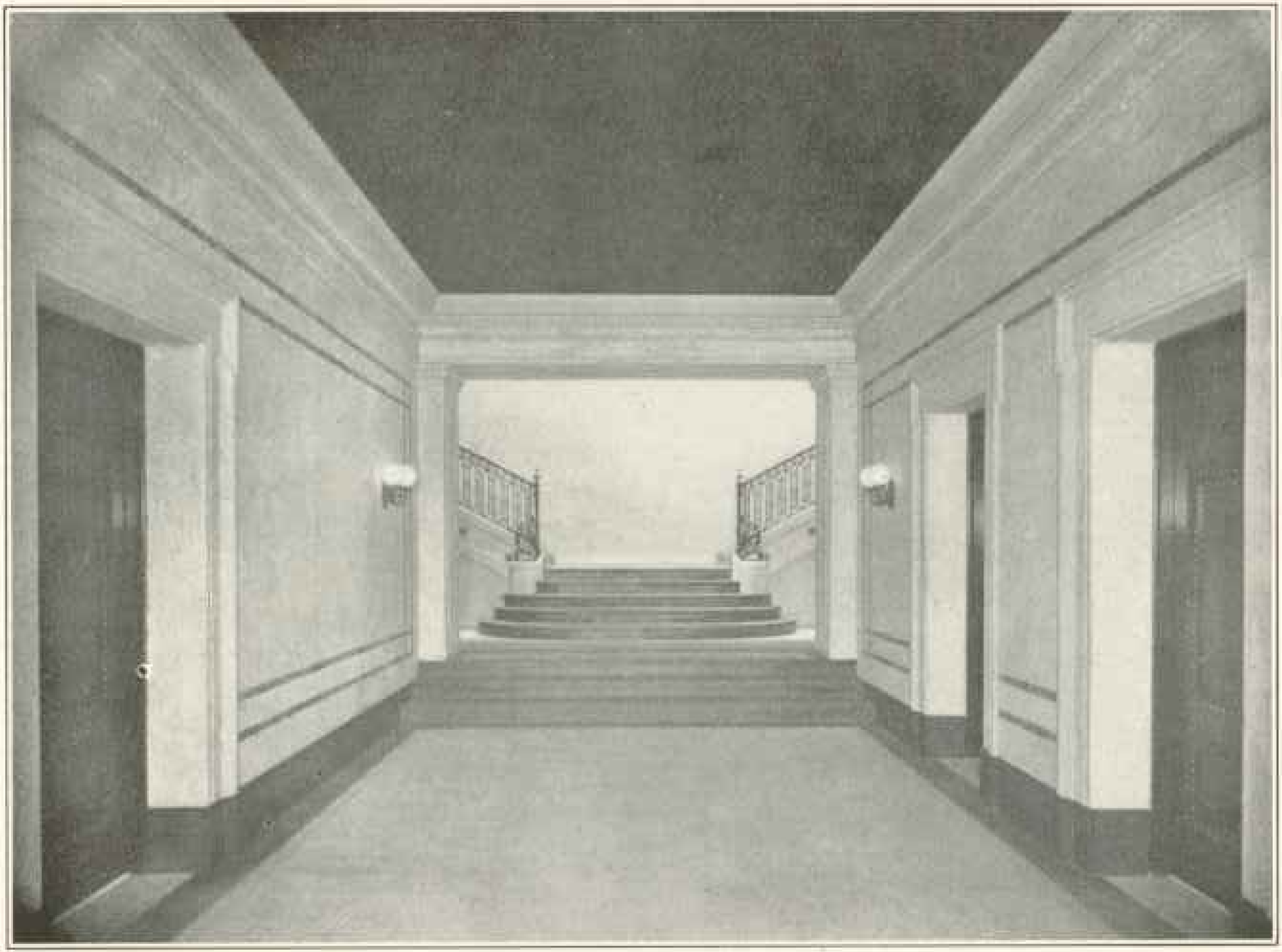


Photo by Leet Bros.

Hornblower & Marshall, Architects

View of Marble Entrance Hallway

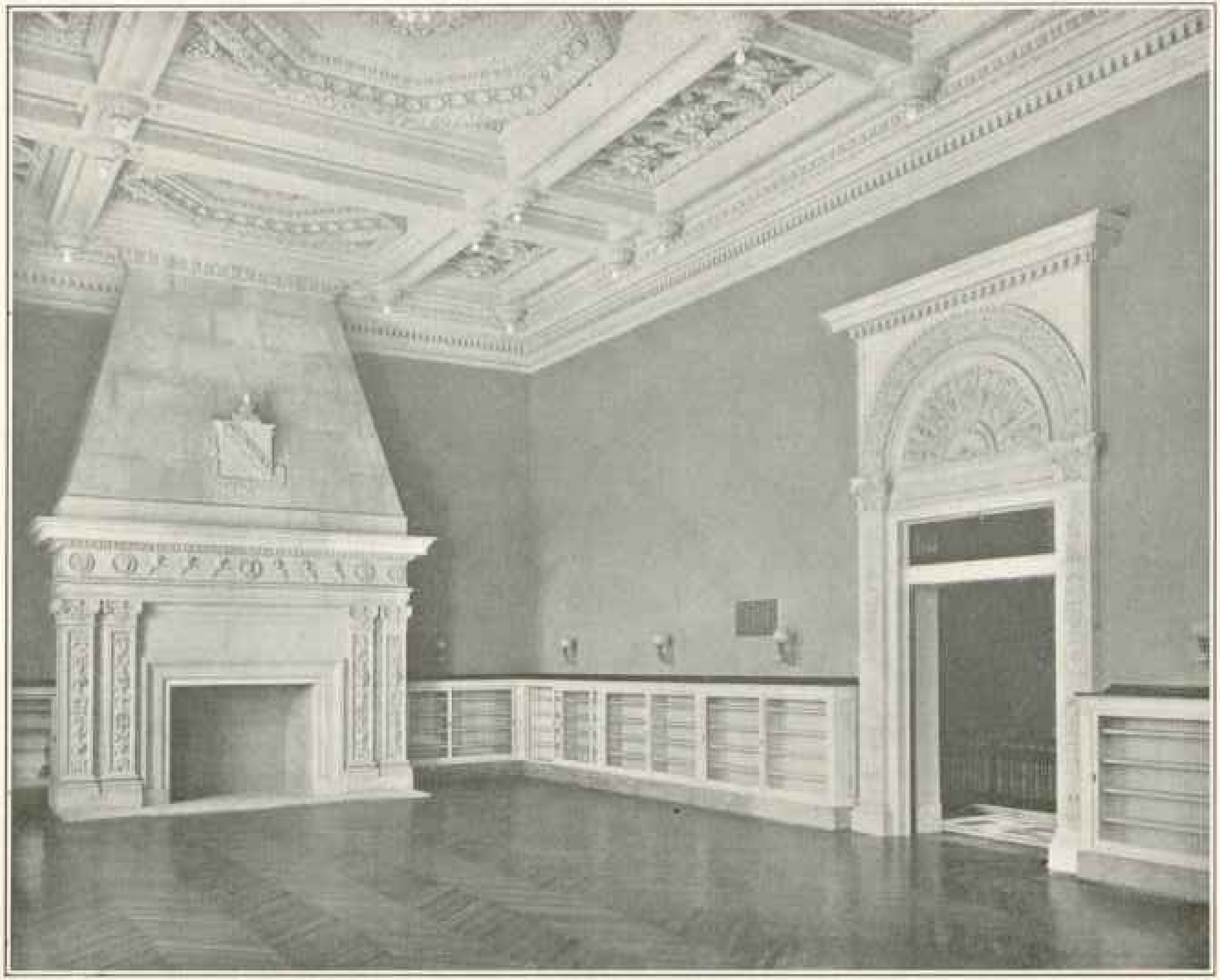


Photo by Leet Bros.

Allen & Collins, Architects

The Library and Meeting Hall

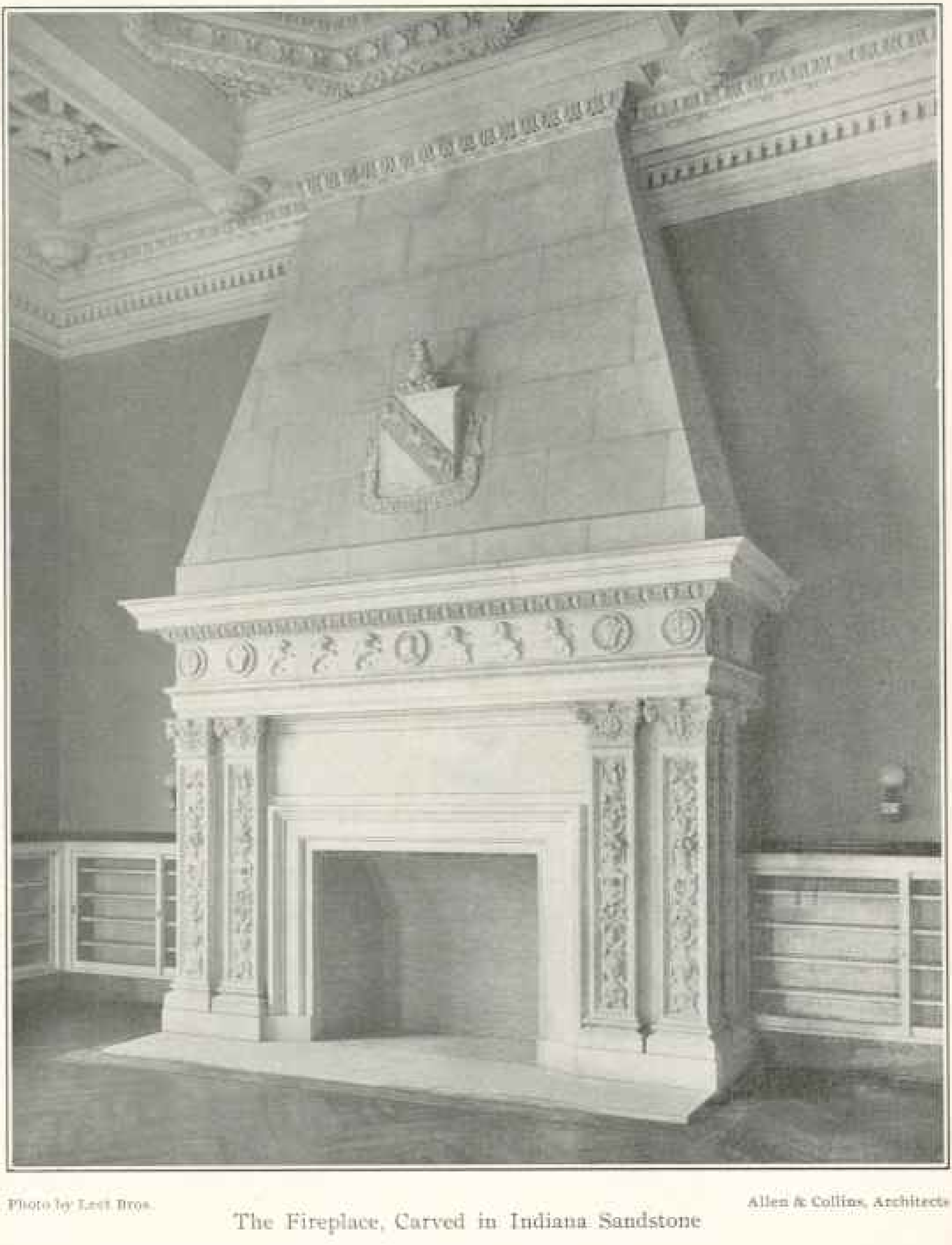


Photo by Leet Bros.

Allen & Collins, Architects

The Fireplace, Carved in Indiana Sandstone

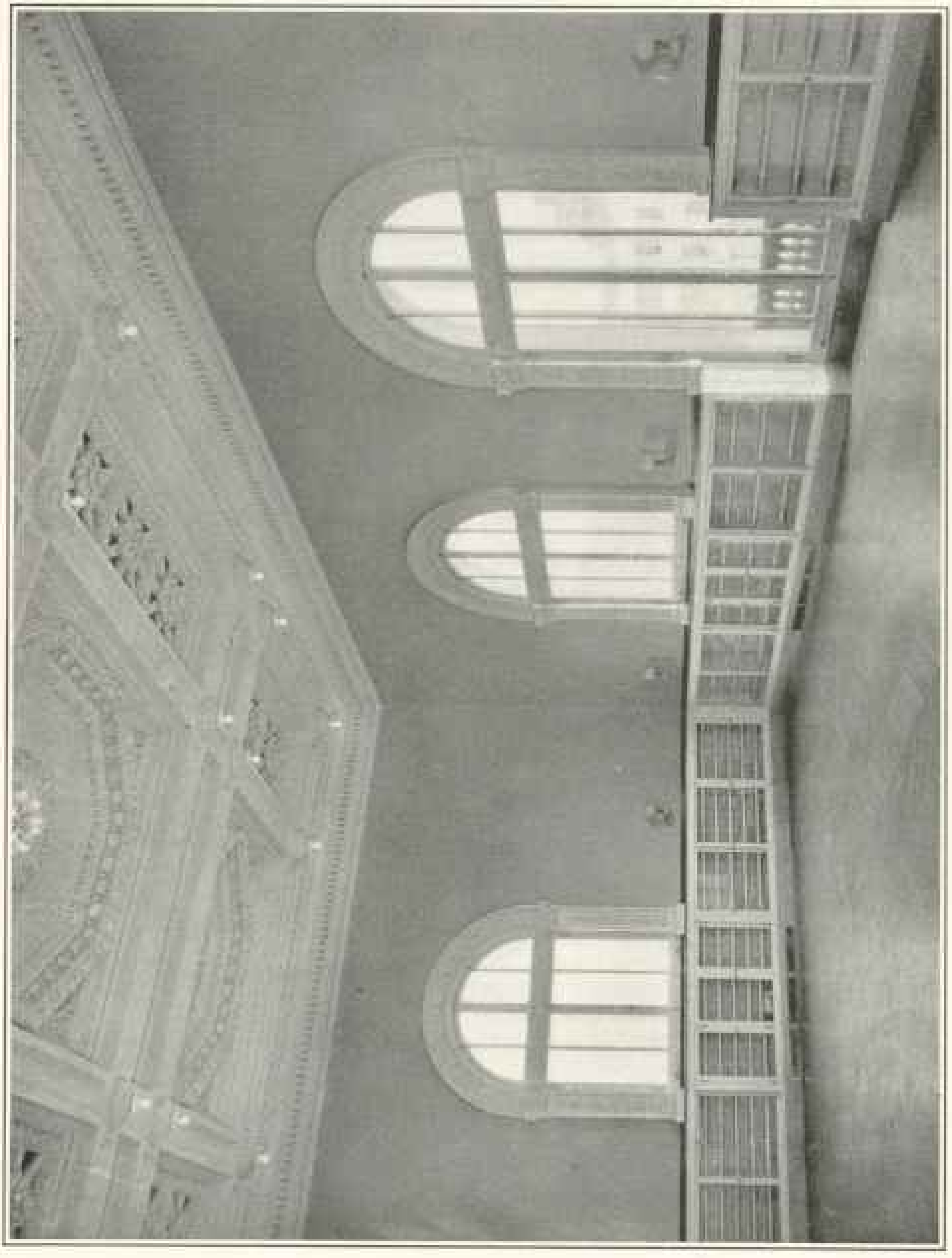
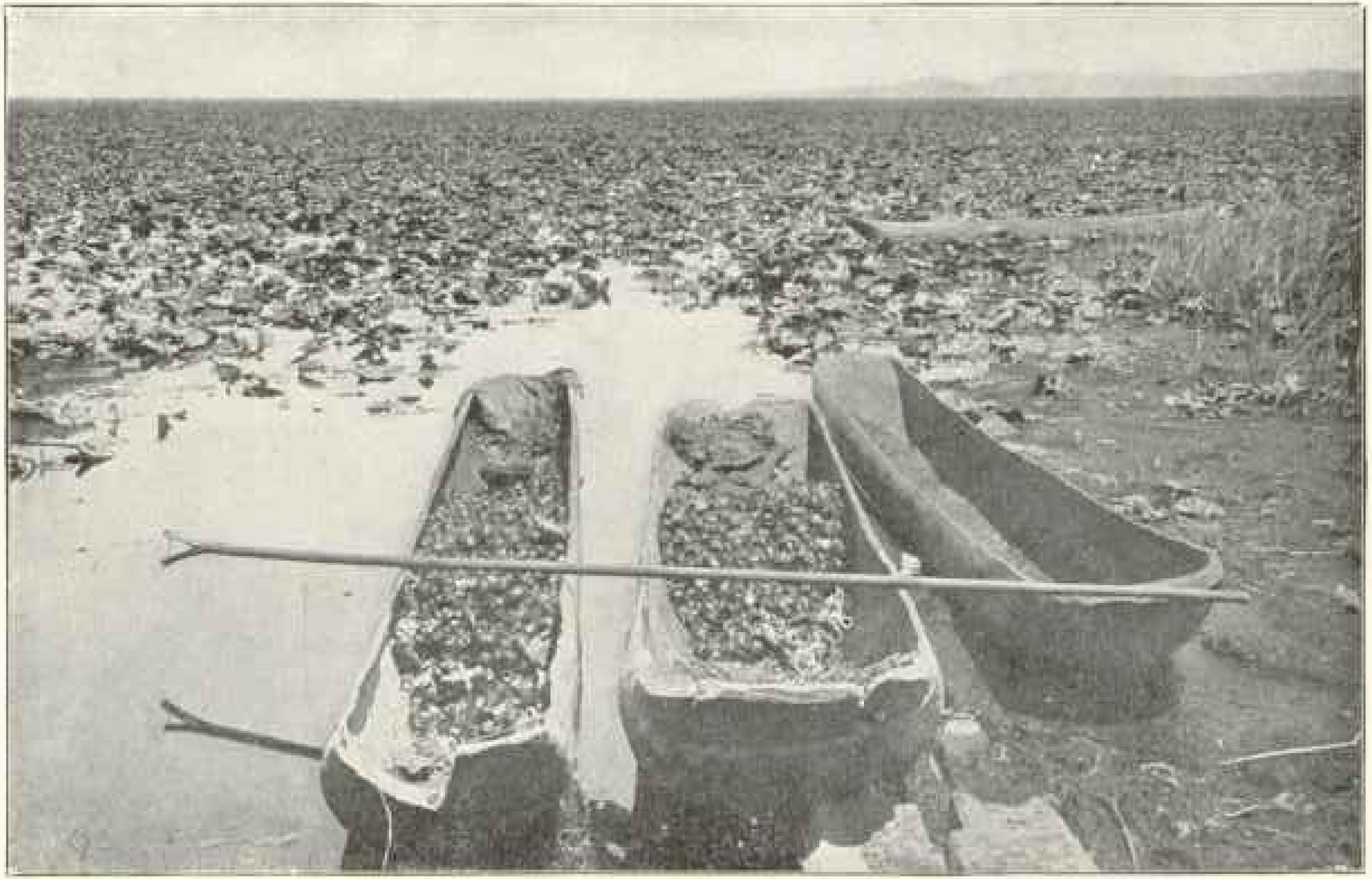


Photo by Leet Bros.

Another View of the Library and Meeting Hall

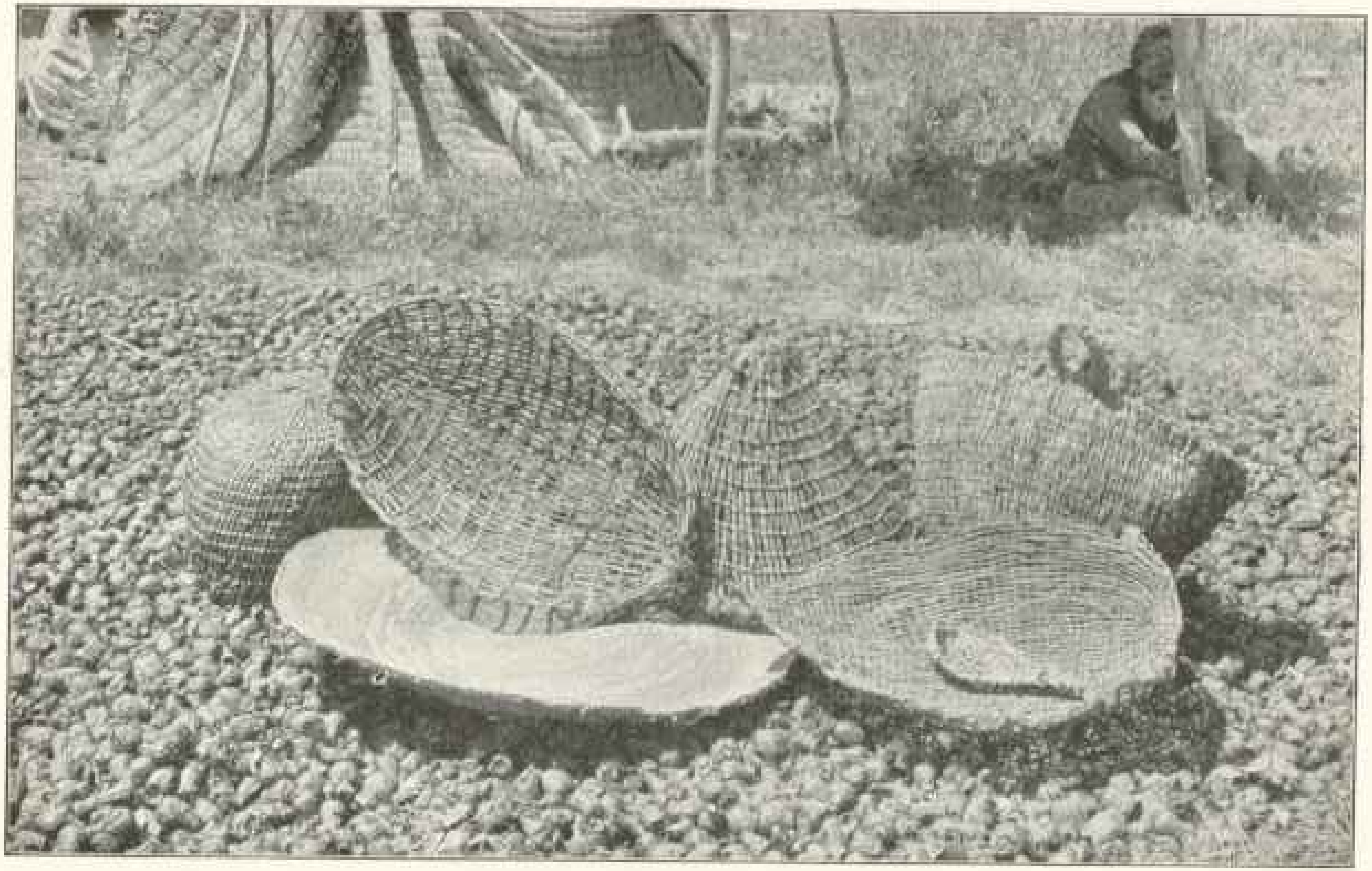
Allen & Collins, Architects



From F. V. Coville, U. S. National Museum

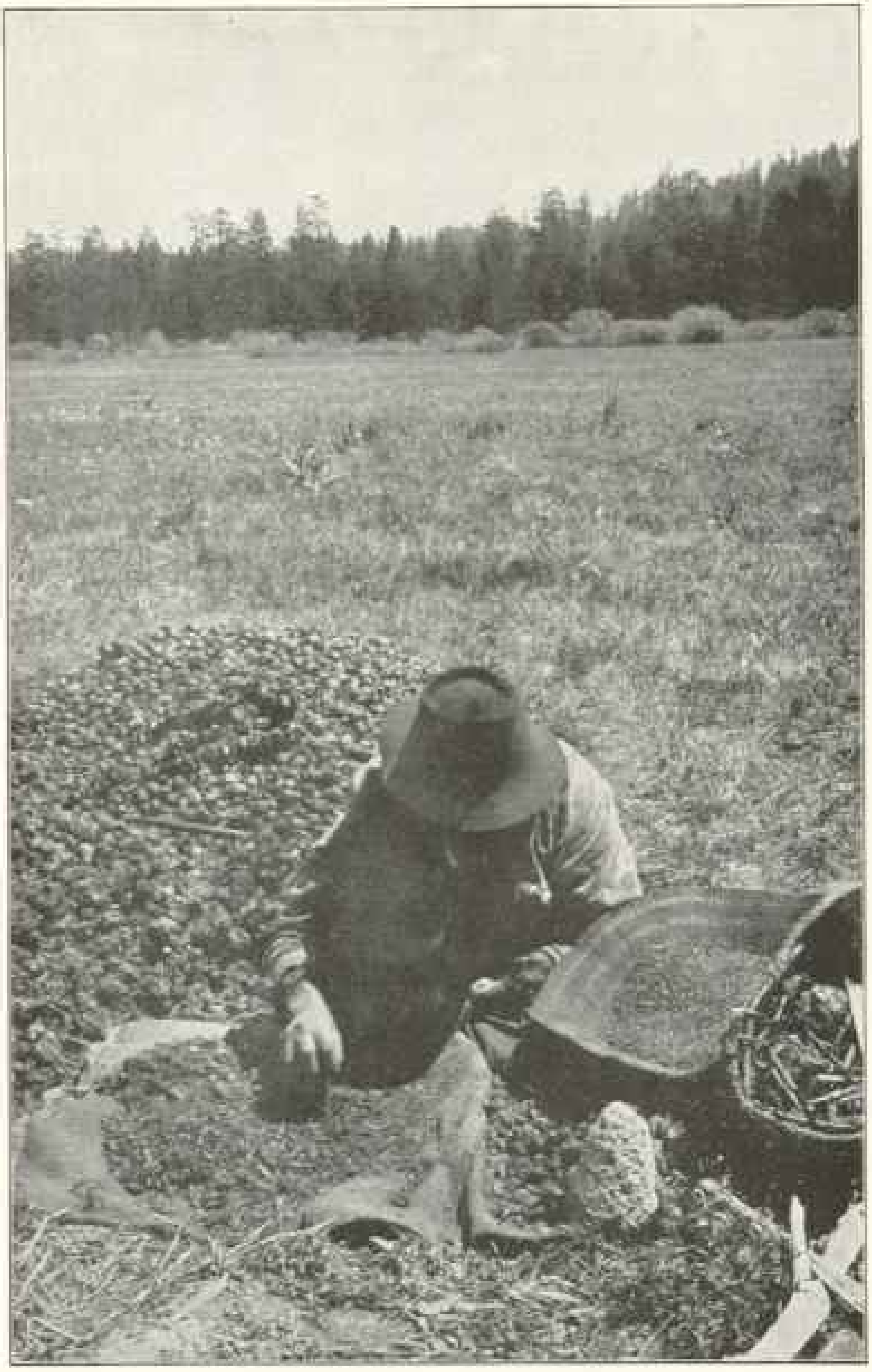
Ten Thousand Acres of Wokas or Waterlilies. Indian Dugouts Used for Gathering the Wokas Pods

The boat is pushed along by the pole. All the harvesting is done by the women



From F. V. Coville, U. S. National Museum

A Pile of Wokas Pods Drying in the Sun. Several Winnowing Trays and Baskets are Shown



From F. V. Coville, U. S. National Museum

Crushing the Dried Pods to Obtain the Seeds. The Seeds are in Turn Cracked or Heated to Get the Kernels

GEOGRAPHIC NOTES

WOKAS, A PRIMITIVE INDIAN FOOD

AT the foot of the Cascade Mountains, in southwestern Oregon, there is a great marsh called Klamath Marsh. In spring it is covered with beautiful yellow water lilies, which grow so vigorously as to completely exclude the usual marsh vegetation. Later in the season, when the flowers drop away and the pods form and ripen, crowds of Klamath Indians come and gather the pods or "wokas." They shell the pods in various laborious ways by drying them in the sun or over a fire, and then cracking the seed found inside the pods get a kernel, the taste of which delights the most fastidious palate. The Indians roast the kernels or make meal from them; they consider the wokas a great delicacy and hoard their seeds with much care.

In the last report of the National Museum Mr F. V. Coville gives an interesting description of the wokas and of how the Indians harvest their unique crop. He declares that the wokas are delicious when freshly parched and eaten with cream, and thinks that if some economical method of getting the seeds out of the pods could be devised it would prove a popular breakfast food. The supply will be always limited, however, to what is now growing in Klamath Marsh and in several smaller areas on the northwest coast. The lily can not be grown commercially elsewhere. In former times the wokas was a staple food of the Indians. Pictures of the wokas marsh and seeds are shown on pages 182–184.

A LABRADOR EXPEDITION

THE terrible experiences of the Leonidas Hubbard Expedition to central Labrador, ending with the tragic death of Mr Hubbard, is described in a letter from A. Dillon Wallace, a member of the expedition, to a relative in New York. The party of three—Hubbard, Wallace, and one guide—left Northwest River, Labrador, July 15, 1903, bound for Lake Michikamau, 400 miles inland. They took a scanty supply of provisions, expecting game would be plentiful; but with the exception of one caribou, which they shot, and a rare grouse or goose, they saw nothing living during the entire journey. They reached the lake September 15 in a starving condition, and found no game there either. They struggled back, with nothing to eat except straps and skins, which they soaked. Finally, on October 18, Hubbard became so weak that the party decided he must be left and the others push ahead for help. Wallace and the guide gave him almost all they had and pushed ahead, but in a few hours Wallace, too, became exhausted and unable to advance. He tried, then, to return and join Hubbard, but in his weakness lost his way. Meanwhile the guide kept on and fell in with a party of trappers. Going back they found Wallace wandering about, crazy, and Hubbard dead. Wallace has since recovered.

THE ANTARCTIC CONTINENT

THAT a vast Antarctic continent exists, perhaps twice as large as Europe, would seem to be proved by the reports now appearing of the recent explorations in that region. The American Commander Wilkes, returning from the far south in 1841, asserted the existence of a vast South Polar continent, and described his voyage of 1,500 miles in sight of the coast. Ross, however, returning soon after, discredited Wilkes' conclusions, saying that the land seen by Wilkes was merely a great wall of ice. The world has been in doubt which to believe.

That Ross was wrong and Wilkes right is very evident from the report of Captain Scott, of the British Antarctic

Expedition of 1901–1904. Captain Scott shows that the mass of ice seen by Ross is in reality an extensive glacier resting on land and covering the land like the ice cap of Greenland. The glacier is about 700 miles wide, and reaches the sea through a plain lying between Victoria Land and Edward VII Land. The German expedition under Von Drygalski, working 80 degrees of longitude farther west, also found a somewhat similar expanse of ice-capped land, whose limits they were unable to trace, but which is apparently a part of the same Antarctic continent.

THE NATURAL-GAS, OIL, AND COAL SUPPLY OF THE UNITED STATES

IT would appear from Mr F. H. Oliphant's report on the "Production of Natural Gas in 1902," published by the Geological Survey, that all the countries of the world combined produced in 1903 only about 1½ per cent as much natural gas as the United States. Our production in value amounted to $30,867,668. The reckless and appalling waste that followed the discovery of the use of the gas has been checked. The economy has come rather late, but enough of the original supply remains, stored principally in the deep and prolific sands of northern and southwestern Pennsylvania and western Virginia, to furnish the ideal household fuel for many years.

In the forty-odd years since Colonel Drake discovered petroleum on the waters of Oil Creek, near Titusville, Pa., no less than 1,165,280,727 barrels of crude petroleum had been produced to the end of 1902. That means that if 2½ feet were allowed for the height of a barrel and if these barrels, filled with all the domestic oil that has been produced, were laid so that their heads touched, they would encircle the earth 2¼ times.

Of this total production, Pennsylvania and New York produced 53.9 per cent, Ohio 24.3 per cent, West Virginia 11.3 per cent, Indiana 3.9 per cent, California 3.6 per cent, Texas 2.1 per cent, leaving .9 per cent to be supplied by the States of Kansas, Colorado, Louisiana, Illinois, Missouri, Indian Territory, Wyoming, Michigan, and Oklahoma Territory. These figures are from Mr F. H. Oliphant's report on "The Production of Petroleum in 1902."

The United States is now producing a little more than one-third of the entire coal output of the world. Her production reached 301,582,348 short tons in 1902, while Great Britain, so long the chief coal supplier of the world, produced 47,000,000 tons less, or 254,346,447 short tons, and Germany 165,826,496 tons. This estimate is from the report of the Geological Survey on "Coal in 1902," prepared by E. W. Parker.

THE DEALINGS OF THE UNITED STATES WITH THE NATIONS OF THE WORLD.

THERE is so much interest at the present time in the commercial relations of the United States with all nations that the following table, showing the extent of our dealings with the principal countries of the world, is specially useful. The table is from the Statistical Abstract of the United States, just published by the Bureau of Statistics, and gives the figures of the latest available year, 1903 in most cases.

It is interesting to observe that the exports of the United States exceed that of any other nation. Last year we sent to Russia $7,518,177 worth of goods, to Japan $21,622,603, to China $22,698,282, and received from Russia $7,262,757, from Japan $40,597,582, and from China $26,182,133. Many will be surprised to learn that the foreign trade of the Netherlands nearly equals that of France, and is surpassed only by the United States, the United Kingdom, Germany and France, being more than double that of Russia.

Table Showing Foreign Commerce of All Nations, and Trade of United States with Each Nation.

Countries.	Total imports.	Exports from United States to—	Total exports.	Imports into United States from—
	Dollars.	*Dollars.*	*Dollars.*	*Dollars.*
Argentina	99,433,000	9,808,529	173,205,000	10,396,873
Australian Commonwealth	[a] 203,644,000	28,101,784	[a] 213,713,000	[b] 13,845,001
New Zealand	[b] 55,121,000		[b] 66,403,000	
Austria-Hungary	349,283,000	6,672,580	387,526,000	10,093,346
Belgium	439,282,000	43,515,112	358,464,000	17,912,084
Bolivia	5,587,000	76,926	11,076,000	1,731
Brazil	113,288,000	11,155,565	177,323,000	71,583,086
British colonies	475,370,000	57,886,757	280,744,000	22,875,024
Bulgaria	13,731,000	....	20,011,000	....
Canada	224,814,000	123,472,416	213,782,000	54,660,410
Costa Rica	4,415,000	1,697,043	5,661,000	3,291,545
Guatemala	3,018,000	1,128,418	7,134,000	2,190,145
Honduras	1,672,000	969,963	2,357,000	1,136,220
Nicaragua	2,185,000	1,364,518	3,243,000	2,119,313
San Salvador	2,624,000	868,329	3,926,000	383,159
Chile	48,336,000	3,753,222	61,879,000	7,155,839
China	198,364,000	22,698,282	134,720,000	26,182,113
Colombia	10,695,000	2,923,404	18,487,000	3,140,043
Cuba	58,826,000	21,769,572	77,849,000	62,341,942
Denmark	116,714,000	14,812,900	85,733,000	68,494
Ecuador	7,029,000	1,347,850	8,811,000	1,823,166
Egypt	73,229,000	667,577	87,081,000	10,854,628
Finland	45,197,000	(c)	38,717,000	(c)
France	848,046,000	70,497,327	820,671,000	87,895,253
Algeria	64,228,000	[d] 386,758	60,804,000	[d] 461,102
Tunis	12,483,000		7,551,000	
French colonies	46,808,000	2,785,418	35,806,000	1,088,493
French East Indies	41,964,000	62,361	40,677,000	3,873
German Empire	1,340,178,000	174,264,495	1,113,313,000	111,999,904
German colonies	8,969,000	30,949	4,497,000	11,702
Greece	26,034,000	369,919	15,466,000	1,229,144
Haiti	5,500,000	1,956,343	12,760,000	1,127,641
India, British	255,614,000	4,866,683	408,396,000	51,831,665
Italy	342,718,000	33,135,512	284,177,000	33,612,864
Japan	135,322,000	21,622,603	127,326,000	40,597,582
Formosa	5,030,000		6,881,000	
Korea	6,744,000	257,130	4,142,000	....
Mexico	74,687,000	42,227,786	88,200,000	[b] 61,802,902
Netherlands	867,308,000	74,576,164	732,975,000	20,899,588
Dutch East Indies	86,894,000	2,210,963	98,724,000	15,343,948
Norway	78,869,000	(e)	45,147,000	(e)
Paraguay	2,270,000	14,815	3,787,000	3,890
Persia	21,703,000	....	13,243,000	....
Peru	21,062,000	2,573,289	17,938,000	2,826,493
Portugal	60,044,000	2,915,897	30,709,000	3,229,813
Roumania	54,686,000	138,635	72,340,000	65
Russia	305,614,000	7,518,177	392,215,000	7,262,757
Santo Domingo	2,987,000	1,700,371	5,224,000	3,361,319
Servia	8,650,000	....	13,920,000	33,149
Siam	16,515,000	....	22,065,000	....
Spain	175,499,000	15,976,788	154,164,000	8,787,621
Sweden	134,603,000	9,530,137	105,154,000	4,193,307
Switzerland	217,803,000	203,357	168,741,000	19,864,767
Turkey	117,134,000	354,457	59,072,000	2,359,830
United Kingdom	2,571,416,000	523,773,397	1,379,283,000	180,249,114
United States	1,025,719,000	....	1,392,231,000	....
Philippine Islands	32,972,000	4,038,909	33,122,000	11,372,584
Uruguay	24,565,000	1,549,812	33,656,000	2,830,069
Venezuela	8,458,000	2,736,726	17,962,000	6,609,919
Total	11,602,973,000	1,356,965,925	10,260,184,000	1,003,224,820

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[a] Exclusive of intercolonial commerce, but including gold and silver. [b] Including gold and silver. [c] Included under Russia. [d] French Africa. [e] Included under Sweden.

Indian Baskets. The main feature of the report of the National Museum for 1902 is a remarkable monograph on Aboriginal American Basketry by Otis T. Mason. The paper is illustrated by 250 full-page plates, many of them colored, and by 212 figures in the text. The colored plates are particularly beautiful and well printed. "Basketry and pottery are the sibylline leaves on which are written the thoughts and lore of our Indians." The report is particularly important, as it is the first expert and comprehensive description of Indian basketry published.

The Mining Year Book of the U. S. Geological Survey is nearly ready for distribution. It is entitled "Contributions to Economic Geology, 1903," and was prepared under the supervision of Messrs C. W. Hayes and S. F. Emmons. The volume contains 50 short articles by thirty of the Survey's best-known geologists on the year's developments in various mining interests of the United States and Alaska—gold, silver, copper, coal, tin, oil, etc.

Commercial Korea in 1904 is the title of a monograph issued by the Department of Commerce and Labor through its Bureau of Statistics. It discusses commercial and other conditions in Korea, showing area, population, transportation facilities, railways, telegraphs, postal service, and foreign commerce.

Commercial China in 1904, published by the Bureau of Statistics, contains a vast amount of useful information about the Chinese Empire—treaties, railways and waterways, population, resources, recent development, etc.

A memorial to Professor Joseph Le Conte has been constructed by the Sierra Club of San Francisco in the Yosemite Valley at a cost of $8,000. It is a building of granite, erected under the walls of Glacier Point. The building is divided into three parts, the main room measuring 28 by 38 feet. Above the main room a Gothic roof rises to the height of 35 feet. Inside are a large reading table, wall seats, and a large bookcase in which are kept books and papers pertaining to travel and research and maps and papers furnished by the Sierra Club.

Map of Alaska. THE NATIONAL GEOGRAPHIC MAGAZINE in its May number will publish a map of Alaska, 42 x 36 inches. The map was prepared by the U. S. Geological Survey and shows the latest surveys and explorations. It is in three colors and should prove extremely useful to all who are interested in the rapid development of the territory. The map will be supplemented by an article by Mr Alfred H. Brooks, Chief of the Alaskan Division of the Geological Survey.

TOPOGRAPHIC SHEETS RECENTLY PUBLISHED BY THE U. S. GEOLOGICAL SURVEY

California: The Tejon and Yosemite quadrangles.

Indiana: New Harmony and Haubstadt quadrangles

Kansas: Iola quadrangle.

Maine: The Blue Hill quadrangle.

Maryland: Baltimore and vicinity.

Montana: The Saypo, Browning, and Coopers Lake quadrangles.

North Carolina: The Newberne and Tarboro quadrangles.

Ohio: Maps of fourteen quadrangles—the Bowling Green, Elmore, Fremont, Vermilion, Euclid, Cleveland, Wooster, Dublin, Delaware, Canton, Massillon, Fostoria, and Oberlin.

Texas: The Polvo and Terlingua quadrangles

Utah: Hayden Peak quadrangle.

The maps, as a rule, are named after the most important town in the district covered. The maps may be purchased of the Survey for 5 cents each

"Geographic Tables and Formulas" (Bull No. 214), recently published by the Geological Survey, includes all tables and formulas used by topographers in the field and office. The tables were compiled by S. S. Gannett and the material revised by E. M. Douglas and H. L. Baldwin.

GEOGRAPHIC LITERATURE

Korea. By Angus Hamilton. With map and illustrations. Pp. xliii + 313. 5½ by 8 inches. New York. Chas. Scribner's Sons. 1904. $1.50 *net*.

This is an exceedingly clear and able description of the Koreans and their country and of the political and commercial problems of which Korea is the cause. Mr Hamilton defines the people as follows:

"The Koreans are an agricultural people, and most of the national industries are connected with agriculture. More than seventy per cent of the population are farmers. . . .

"The peaceable, plodding farmer of Korea has his counterpart in his bull. The Korean peasant and his weary bull are made for one another. Without his ruminating partner, the work would be impracticable. It drags the heavy plough through the deep mud of the rice fields, and over the rough surface of the grain lands; it carries loads of brick and wood to the market, and hauls the unwieldy market cart along the country roads. The two make a magnificent pair; each is a beast of burden.

"They submit to oppression and to the cruelty of the Yamen; they endure every form of illegal taxation, and they ruin themselves to pay 'squeezes,' which exist only through their own humility. . . .

"At the present date the farmer of Korea is the ideal child of nature; superstitious, simple, patient, and ignorant. . . .

"To the wayfarer and stranger the individual farmer is supremely and surprisingly hospitable. A foreigner discussing the peculiarities of their scenery, their lands, and the general details of their life with them, is struck by their profound reverence for everything beyond their own understanding, and their amazing sense of the beautiful in nature.

"The Korean is omnivorous. Birds of the air, beasts of the field, and fish from the sea, nothing comes amiss to his palate. Dog-meat is in great request at certain seasons; pork and beef with the blood undrained from the carcase, fowls and game—birds cooked with the lights, giblets, head and claws intact, fish, sun-dried and highly malodorous, all are acceptable to him.

"Their excesses make them martyrs to indigestion."

A Handbook of Modern Japan. By Ernest W. Clement. With maps and illustrations. Pp. 395. 5 by 7½ inches. Chicago: A. C. McClurg & Co. 1904. $1.50.

Mr Clement, who has lived for 15 years in Japan, has collected in his handbook exactly the information regarding that nation sought by every one at the present time. His aim has been to portray Japan in all its features as a modern world power. The descriptions are concise and effective. There are admirable chapters on the Physiography, History, Local Self-government, Japan as a World Power, Japanese Christendom, and the Mission of Japan. An excellent feature is a bibliography of reference books at the end of each chapter, while in the appendix are numerous tables giving interesting statistics. One of these shows that the ratio of cultivated land to the total area of the country is only 13.8 per cent; in Belgium the ratio is 53.9; in Prussia, 50.3; in France, 50.2; in England, 27.9. The volume is well illustrated with pictures of important persons and scenes.

BOOKS RECEIVED

Greater Russia. By Wirt Gerrare. Illustrated. Pp. 337. 6 by 9 inches. New York: The MacMillan Co. 1904. $3.00.

Birds of California. By Irene Grosvenor Wheelock. Illustrated. Pp. xxviii + 578. 5½ by 7½ inches. Chicago: A. C. McClurg & Co. 1904. $1.50.

Steps in the Expansion of Our Territory. By Oscar P. Austin. With 33 maps. Pp. 258. 5 by 7½ inches. New York: D Appleton & Co. 1903. $1.25 *net*.

In Famine Land. By J. E. Scott. Illustrated. Pp. 206. 5½ by 8½ inches. New York: Harper & Bros. 1904.

Geology. By Thomas C. Chamberlin and Rollin D. Salisbury. In two volumes. Volume 1. Geologic Processes and their Results. Illustrated with plates and diagrams. Pp. xix + 654. 6 by 8½ inches. New York: Henry Holt & Co. 1904.

Nebraska Geological Survey. By State Geologist Erwin H. Barbour. Volume I. Illustrated. Pp. 258. 7 by 10 inches. Lincoln, Neb. 1903.

A Journey to Lhasa and Central Tibet. By Sarat Chandra Das. Edited by W. W. Rockhill. Illustrated. Pp. x + 285. 5½ by 8½ inches. New York: E. P. Dutton & Co. 1902. $3.50 *net*.

Letters from a Chinese Official. Pp. 75. 5 by 7 inches. New York: McClure, Phillips & Co. 1904.

Alaska. Edited by C. Hart Merriam. Illustrated. Volume III. Glaciers and Glaciation. By Grove Karl Gilbert. Pp. xii + 232. 10½ by 7 inches. Volume IV. Geology and Paleontology. By B. K. Emerson, Charles Palache, William H. Dall, E. O. Elrich, and F. H. Knowlton. Pp. 173. New York: Doubleday, Page & Co. 1904. $10.00.

Field and Laboratory Exercises in Physical Geography. By James F. Chamberlain. Pp. 127. 8 by 10 inches. New York: American Book Company. 1904.

Climatology of California. By Alexander G. McAdie. Illustrated with plates and diagrams. Pp. 270. 9½ by 12 inches. U. S. Weather Bureau series. Washington. 1904.

A List of Books on the Philippine Islands in the Library of Congress. By A. P. C. Griffin and P. Lee Phillips. Pp. xv + 397. 7½ by 11 inches. Government Printing Office.

Alaskan Boundary Tribunal. The case of the United States. Pp. 550. 6 by 9½ inches. 1903.

Alaskan Boundary Tribunal. The counter-case of the United States. Pp. 290 + xii. 6 by 9½ inches. 1903.

Alaskan Boundary Tribunal. The argument of the United States. Pp. vi + 204. Appendix 18. 6 by 9½ inches. Government Printing Office. 1903.

The Philippine Islands, 1493–1898. Volume XI. 1599–1602. By Blair and Robertson. Pp. 316. 6½ by 9½ inches. Arthur H. Clark Co., Cleveland, Ohio. 1904. $4.00.

U. S. GEOLOGICAL SURVEY

California Hydrography: Joseph Barlow Lippincott.

Report of the Progress of Stream Measurements for the Calendar Year 1902: F. H. Newell. Parts 1, 2, and 3.

The Relation of Rainfall to Run-off: George W. Rafter.

The Production of Nickel and Cobalt in 1902: Joseph Hyde Pratt.

The Mineral Resources of the Mount Wrangell District, Alaska: Walter C. Mendenhall and Frank C. Schrader.

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